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Steel Treaters Reach New Heights

Notable Array of Technical Contributions at Chicago Convention Last Week—Exposition Surpasses All Others in Scope and Size

Drake Hotel, Chicago

AGAIN a new record by the American Society for Steel Treating at its annual meeting this year! Both in its technical and exhibition phases, the eighth annual convention and steel and machine tool exposition surpassed any previous affairs. Meeting this year at Chicago, Sept. 20 to 24, it in a measure celebrated the eighth anniversary of its birth. In 1919, at the Seventh Regiment Armory in the same city, the first convention and exhibition of the American Steel Treating Society was held. This finally expanded into the present large organization, and the contrast between the imposing achievement of this year and the one seven years ago has been most striking. This story has been told many times.

In technical offerings this year's program fully sustained the high standard set last year at Cleveland, Sept. 21 to 25. In attendance and keen interest, the former high water marks were met. The outstanding feature was the expansion of the exposition—exceeding by nearly 100 per cent the space engaged and the number of exhibitors a year ago.

Open-Hearth Operating Problems

OVER 35 papers were presented at the 10 sessions held by the American Society for Steel Treating in the ball room of the Drake Hotel, the headquarters. With two exceptions, the sessions were devoted to miscellaneous topics, the program in each case being a varied one. The features were the steel-melting session and the symposium on hardness. About 60 per cent of the papers were pre-printed. In the following columns only the chief features of each session are briefly presented.

A year ago the board of directors inaugurated, at the Cleveland meeting, the plan of holding a session on steel and steel melting. It was a decided success and had the largest attendance of any meeting. This year an excellent program of four papers, under the organization and chairmanship of W. J. Priestley, Electrometallurgical Sales Corporation, New York, was presented before a large audience.

Hair Cracks in Steel Rails

One paper came from a British author. It was entitled "Hair Cracks in Steel Rails," by J. H. Whitely, South Durham Steel & Iron Co., Ltd., Malleable Works,

Chicago Municipal Pier, Which Housed the Steel and Machine Tool Exhibition

E. J. Lowry (at left), metallurgist Hickman, Williams & Co., Chicago, contributed a paper entitled "Desulphurization." His career has included a factory foremanship at the Watertown Arsenal, research work for the United States Cartridge Co., and work as chief chemist and metallurgist for the Oliver Chilled Plow Works. His present work takes him around the country consulting with clients on iron and steel manufacturing problems

A. L. Feild (at right), physicist Central Alloy Steel Corporation, Canton, Ohio, read a paper on "Solidification of Steel in the Ingot Mold." For work on viscosity of blast furnace slag he was the recipient of the J. C. Johnson, Jr., prize of the American Institute of Mining and Metallurgical Engineers. He investigated the effects of zirconium in steel during a connection with the Union Carbide & Carbon Corporation

Stockton-on-Tees, England. It was read by Arthur Briefly, the author contends that hair cracks are due Meyer, Alan Wood Iron & Steel Co., Philadelphia. to poorly made steel. He describes various tests he made to detect these and similar flaws, in which he used two methods, the magnetization and treatment with iron dust in kerosene, and the effect of a reagent. Microscopic examination revealed the chief features. The faulty steel contained numerous cavities filled with gas under high pressure, due in part to the rapid cooling in sorbitizing. As a result, severe stresses developed near the cavities, forming local incipient cracks. It was also shown that the steel was over-oxidized, causing nearly all the trouble.

Hair Lines in Crankshafts

F. T. Sisco, metallurgist Air Corps, McCook Field, Dayton, Ohio, asked whether the author considers hair lines dangerous. In an inspection of 100 crankshafts, they all contained hair lines, he said; and it is not going too far to say that, in the case of chrome-nickel steels, if a highly polished section such as a crankshaft is carefully examined, the defect will be found in practically every case.

Mr. Sisco said he had had the same experience with ball-bearing steels. The prevalence of this defect in alloy steels makes it important to know just what effect these lines may have in accelerating failure by fatigue or vibratory stresses. Crankshaft failures in service are comparatively rare, which would seem to indicate that they are not dangerous, though, on the other hand, many failures cannot be explained in any other way.

Rail Steel Semi-Finished Material

Contending that most rail steel is semi-finished steel, George Dornen, Gathmann Engineering Co., Baltimore, said such steel will pass most specifications but a better-made steel would undoubtedly result in a superior rail. J. G. Morrow, Steel Co. of Canada, Hamilton, Ontario, testified that the use of hot tops had resulted at their plant in less cracks and defects in rails.

Open-Hearth Practice

A valuable contribution to open-hearth literature was a paper entitled "Basic Open-Hearth Practice," by C. H. Herty, Jr., research associate Massachusetts Institute of Technology, school of chemical engineering practice, Lackawanna, N. Y. The author takes three heats of steel having three types of charges for comparison. The first two are pig iron and scrap heats with no ore, one being charged with very heavy scrap and the other with only medium scrap. The third heat is an iron-ore heat, 20,000 lb. of ore being charged with this scrap.

The author's comparison covers the absorption of sulphur by the scrap during melting, the oxidation of the scrap, condition of the bath one hour after the hot metal addition, elimination during the lime boil, action of fluorspar in one heat, and other stages up to the final steel. The author does not discuss the effect of the process on the finished steel, preferring to limit the paper to the open-hearth furnace itself.

Desulphurization and Fluxes

The results of an investigation of about 176 heats of steel treated with soda ash, fluorspar and other fluxes are contained in a paper, "Desulphurization," by E. J. Lowry, metallurgist Hickman, Williams & Co., Chicago.

The paper is an assemblage of his own results and those of other workers. One object was to find out the possibilities of soda ash as a substitute for fluorspar and also the desulphurizing effect of these fluxes. He is of the opinion that fluxes have definite lines which divide them into classes which produce (1) proper slags, (2) proper slags combined with an efficient desulphurization and (3) improper slags. He believes that a secondary function of the three factors, slags, fluxes and desulphurizers is temperature which plays a most important part, and he sets forth by means of tables and a resumé exactly what work was performed and what fluxes were used.

Some exceptions were taken to some of the author's statements by C. H. Herty, Jr., who contended that one cannot study fluxes without taking into account the entire composition of the slag. In his experience, the use of large amounts of soda ash did not reduce the sulphur in the steel. In adding it to the blast-furnace ladle, soda ash does not act as a desulphurizer when the manganese is high. He also stated that when slags are high in iron oxide, they are thin and active.

Solidification of Steel in the Ingot

Treating mathematically the linear rate of solidification of steel and the location and shape of the shrinkage cavity, with certain simplifying assumptions, Alexander L. Feild, physicist Central Alloy Steel Corporation, Canton, Ohio, made an important contribution to the literature on the steel ingot. His paper was entitled "Solidification of Steel in the Ingot Mold." In the case of steel poured at its melting temperature, the maximum rate of solidification is shown to be inversely proportional to the square root of the elapsed time, measured from the moment of contact between liquid steel and mold wall and also the distance through which solidification has progressed is directly proportional to the square root of the elapsed time. The effect or degree of super-heat above the melting temperature and of mold-wall thickness upon solidification rate are discussed. Finally, equations defining the surface of the shrinkage cavity are derived for mold chambers of uniform cross-section, ordinary taper and inverted taper, and the important effect of pouring rate and taper upon pipe formation emphasized.

Emil Gathmann, president Gathmann Engineering Co., Baltimore, discussed some of Mr. Feild's equations and said that the author's mathematical treatment of a very complex subject is a valuable addition to the literature of the art.

Dr. D. J. McAdam, Jr. (at left), member of the United States Naval Engineering Experiment Station, Annapolis, has specialized in the invention and improvement of machines for impact and endurance tests of metals. His contribution to last week's meeting was a paper on the influence of inclusions on the fatigue strength of steel

Howard M. German (at right), metallurgist with the Universal Steel Co., Bridgeville, Pa., is the author of a paper on "Standardizing of the Brinell Hardness Tests." About 15 years ago he was professor and head of the department of metallurgy at the South Dakota School of Mines, and later was metallurgist for about 10 years with Henry Disston & Sons, Inc., Philadelphia

Considerations of the Hardness Question

SEVERAL papers were presented at a symposium conducted by the hardness testing committee of the society.

Standardizing the Brinell Test

A paper on the "Standardizing of the Brinell Hardness Test" was presented by H. M. German, Universal Steel Co., Bridgeville, Pa. He said that the Brinell test has its limitations in that the only metal that can be tested is that which will stand permanent deformation and that which is of sufficient thickness and hardness so that a bulge will not be caused on the opposite side. The standard load when testing comparatively hard steel is 3000 kg. and in order to obtain accurate readings the load must not be subject to variations. He pointed out defects of various types of machines due to the fact that gages and springs could not retain their accuracy.

He claimed that only one of the various devices for applying pressure that will give an accurate and constant pressure is a type of weight and lever machine in which the load is obtained by weights and compound levers and applied to a plunger containing the ball which is pressed into the piece to be tested. Errors in testing are due to the fact that the applied load is not constant, owing to the design and manipulation of the machine and to the fact that the rate of application of the pressure and the time the full load is applied are not fixed, but are optional with the operator.

The author described a new design of Brinell machine of the weights and levers type operated by a cam through a motor with push button control, which, he said, would overcome the defects found in other types of machines, as it would remove the personal factor, assure fixed rate of pressure of application, fixed time of pressure application and constant application of the load.

This paper was discussed by Herman H. Holz, testing engineer, New York, who said that the Hultgren Brinell balls, which had been mentioned by Mr. German, are now in extensive use and are giving good service, their development representing a distinct advance in hardness testing. The etching of Brinell balls to produce clearer outlines is an American development. Etched balls have been criticized on the ground that a greater load is required to force an etched ball into a metallic surface than would be necessary with a polished ball. However, he had made many tests with etched and polished balls and had been unable to detect the slightest difference due to such theoretical variable friction. The general tendency, he said, is toward the use of hydraulic machines for both hardness and tensile testing. He did not favor the use of automatic machines except for large production work. If power machines are used he favored having them operated with motor driven pumps.

In conclusion, Mr. German said that anything that can be done to eliminate the personal element will help to standardize Brinell tests.

Dr. William M. Guertler, Charlottenburg, Germany, gave a talk on the hardness of metals and Prof. S. R. Williams, Amherst College, Amherst, Mass., discussed in two papers some of the factors that enter into the problems of hardness. One of these papers was on the correlation of magnetic properties with mechanical hardness in cold worked metals and the other on hardness testing of steel balls by magnetic methods.

Toughness of High-Speed Steel

The subject of toughness of high-speed steel was discussed by Robert K. Barry, Barry Co., Muscatine, Iowa, the data being supplemental to a paper previously presented before the society by Mr. Barry. He stated that in his previous paper it had been shown that 18 per cent tungsten high-speed steel previously hardened developed maximum hardness and usable toughness after a 1100-deg. draw. It had been stated that when making impact tests the highest values of greatest strength may be expected after an 890-deg. draw in the range where austenite is being rapidly converted.

Mr. Barry had been asked to prepare several sets of treated test specimens as near alike in composition, physical condition and treatment as possible to further compare impact and deflection test values as governed by various drawing temperatures. The tests were made with cold-drawn high-speed drill rod. The sets tested by impact showed that the highest impact value was obtained after drawing to 900 deg. A drawing at 650 deg. was productive of inferior hardness and the lowest value. This was the point of lowest hardness for a draw up to 1100 deg. The test for deflections showed that up to 1100-deg. draw, the highest deflection was obtained when drawing to 1100 deg., the point of maximum hardness.

He said it is significant that more force was required to break the pieces at 1110 deg. than to break them when drawn at any lower temperature. This clearly indicated the desirability of a 1100-deg. draw when maximum hardness, deflection, strength and fiber stress are required. Low deflection followed an 800-deg. draw. The 900-deg. draw produced values slightly superior to those resulting from 800-deg. draw. However, it is apparent that both draws are inferior unless the results determined by impact testing are accepted.

The speaker remarked that the bundle method of conducting tests of this nature has much in its favor and that the deflection or slow bend method of testing hard steel indicates a superior sensitivity. If in a high-speed tool toughness is most essential, the hardening temperature must be considered or the manner of treating to harden, for attempts to toughen by severe drawing may prove disappointing.

W. J. Merten (at left) discussed "Wear Resistance of Carburized Steel Versus High Manganese Steel." He is metallurgical engineer connected with the Westinghouse Electric & Mfg. Co. Formerly he was metallurgical engineer with the Union Switch & Signal Co., Swissvale, Pa., and the Twin City Forge & Foundry Co., Stillwater, Minn., and was assistant manufacturing superintendent Ohio Brass Co., Mansfield, Ohio

John M. Lessells (at right), metallurgist, Westinghouse Electric & Mfg. Co., presented a study of the fatigue strength, or hardness, and the tensile strength of hard steels. He was born in Scotland and was employed on the staff of the British Air Board as inspector during the war. Among various technical contributions was one for which he was awarded a prize by the Institution of Mechanical Engineers

Discuss Fatigue Failure of Metals

A SERIES of three papers was given on this subject of the fatigue failure of metals. F. F. Lucas, Bell Telephone Laboratories, New York, presented a story of the path of fatigue fracture in ingot iron, illustrated by a series of excellent photomicrographs, taken at very high magnification. Non-metallic inclusions mark the path like stepping stones; a thin disturbed region appears to exist on either side of the crack. Carbide inclusions do not appear to be a source of weakness; neither do grain boundaries, nor do crystallographic planes govern the location of the break.

Another indication of the great influence of inclusions on the fatigue strength of steel was contained in a paper by Dr. D. J. McAdam, of the U. S. Naval Engineering Experiment Station, Annapolis, Md. In a continuation of the work reported last spring to the American Society for Testing Materials, he shows that the fatigue resistance of steels, as determined by the rotating beam test, is greatly lowered by merely playing cold water on the specimen during test. Rapid localized corrosion starts in at the non-metallic inclusions, which corrosion causes incipient cracks to start in a very short time, one of these cracks eventually extending through the sample and causing unexpectedly early failure.

To quote an extreme instance, a 5 per cent nickel steel having a tensile strength of 125,000 lb. per sq. in., a Charpy impact value of 38, and a normal endurance limit of 69,000 lb. per sq. in. is able to withstand only 25,000 lb. per sq. in. alternating stress when in a moist condition.

H. Styri, S. K. F. Laboratories, Philadelphia, in comment, noted that the cleanliness of the steel is known to have a marked influence on the performance of ball bearings. Over half the balls and races examined after fatigue failure show tiny cracks associated with slag. It is also known that corrosion, due to humidity or to unsuitable lubricant will cause premature breakdown of ball races.

Another speaker said that a high tungsten die for bolt-heading gives better performance than a high chromium die when running without coolant; but the relative life was reversed when the die was cooled with a stream of water—a fact which might be taken to indicate a superior corrosion fatigue limit of the chromium steel.

J. M. Lessells, metallurgist of the Westinghouse Electric & Mfg. Co., Pittsburgh, studied the fatigue strength, or the hardness, and the tensile strength of certain hard steels, and found the relation to be nearly constant if the quenced steels were adequately tempered. He thinks that variation from the straight-line relation is due to internal strains induced by the hardening, and by experimentation discovers such residual stresses of the order of 110,000 lb. per sq. in. in the freshly quenced metal.

Wearing Properties of Certain Steels

TWO papers dealing with the wear resistance of some special steels created considerable interest. An abstract of each, with some of the discussion, follows:

Carburized versus Manganese Steel

Experiments conducted to determine the comparative wear resistance of 14 per cent manganese steel and case-hardened steel were the subject of a paper on "Wear Resistance of Carburized Steel vs. High Manganese Steel," by W. J. Merten, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. The experiments were made to ascertain the relative wear-resisting qualities of these steels used in flexible spring seats and pads. A quill drive spring unit assembly was connected to a belt driven crank shaft and clamped between an adjustable stationary upright member, to which were welded the wearing pads, providing apparatus for tests that closely resembled actual service conditions. Direct comparisons of wearing qualities were made by using one seat and pad of carburized plain carbon steel, and the other seat and pad of cast manganese steel. Tables were given showing the results of five tests.

The author said that a summary of the results obtained not only confirms what has been known about plastic flow of 14 per cent manganese steel when subjected to heavy pressure when in a sliding motion, but it also establishes the fact that even under an apparently more favorable structural condition (martensitic) it compares unfavorably with case-hardened steel. However, one factor in favor of manganese steel is that its entire sectional dimension gives practically the same value of wear resistance, while the depth of a wear resistance case in case-hardened steel is rarely more than 3/32 to ⅛ in. He pointed out that favorable results from case-hardened steels obviously depend upon the care exercised in carbonizing and heat treating.

John Howe Hall, metallurgical engineer, Taylor-Wharton Iron & Steel Co., High Bridge, N. J., came to the defense of manganese steel in a prepared discussion which, in his absence, was read by F. F. Lucas, Bell Telephone Laboratories, New York. Mr. Hall said that the conclusion might be drawn from Mr. Merton's paper that, in case of metal-to-metal abrasive, a case-hardened article is better than one of 12 per cent steel. He declared that Mr. Merton's conclusions held good only for such services as characterized by his particular test. Twelve per cent manganese steel in the heat-treated condition is comparatively soft and does

Dr. Kotaro Honda (left) is joint author with Keizo Iwase of a paper on "Transformation of Retained Austensite into Martensite by Stress." Dr. Honda is a member of the Imperial Academy of Japan and director of the Research Institute for Iron, Steel and Other Metals of Japan. He was awarded the Bessemer gold medal by the Iron and Steel Institute of Great Britain and is a prolific author on metallurgical subjects and the recipient of numerous international honors

H. K. Herschman (right) is joint author with H. J. French, both of the Bureau of Standards, of a paper on "Wear of Steels with Particular Reference to Plug Gages." Besides applying himself to research, Mr. Herschman has been admitted to the bar of the District of Columbia

not resist wear unless the wear is accompanied by severe pressure or pounding. Under severe cold working, the hardness of the surface of manganese increases to about 500 Brinell, and, because of this hardness, this steel successfully resists wear accompanied by heavy pressure. This change in surface hardness continues as the manganese steel article wears down, the metal hardening as rapidly as exposed to wear, so that the rate of wear is uniform. This change in hardness is due, he said, to an alteration of the physical state of the metal. He and Mr. Lucas had explored the metallographic change involved, the exact value of which they were not yet ready to make public. Mr. Hall declared that in such service as metal-to-metal gear drives, where the loads are very heavy, manganese steel castings harden rapidly on the surface and will outwear any other material from 5 to 10 times.

Gages and the Wear of Steels

"Wear of Steels with Particular Reference to Plug Gages" was the subject of a paper by H. J. French and H. K. Herschman, Bureau of Standards, Washington, read by the former, that brought out considerable discussion. A new plug gage wear testing was described, and there were outlined the results of tests with the use of this machine with heat treated steel gages and chromium plated gages. Both metal-to-metal wear tests and abrasive wear tests were made. Under wet sliding friction, with the gages in contact with file-hard 1.06 per cent carbon steel rings, the chromium plated gages showed an exceedingly high resistance to wear in comparison with file-hard or file-soft carbon and special tool steels. File-soft gages were more resistant to wear than file-hard gages made from the same steels. The chromium plated gages did not show the marked superiority in wear resistance in the abrasive wear tests that they did in the metal-to-metal wear test, their life being more nearly the same as gages made from quenched and tempered high-speed tool steel, which in turn was more resistant to wear than file-hard or file-soft high carbon, chromium ball race and so-called oil hardening now deforming tool steels. In the abrasive wear tests, and to a lesser degree in the metal-to-metal wear tests, the soft gages were less than the file-hard high carbon steel rings in which they were sliding.

B. H. Blood, Hartford, Conn., in a written discussion of the paper, declared that the authors were doing valuable work, and urged the necessity of cooperation on the part of gage users if laboratory results are to be checked against actual performance. It is apparent, he said, that no one steel and no one heat treatment is likely to be found best for all conditions. He suggested that for the abrasive wear tests shop conditions might be more closely simulated by using in the place of lard and emery a water solution such as is generally employed in grinding operations, carrying the usual amount of abrasive and steel chips. He also suggested that, with plug gages as the starting point of this investigation, similar work on thread gages might be of more importance commercially. In view of the results shown, the wisdom of requiring gages to be file hard may be further questioned, though this depends on the metal to be gaged. He believed it would be advisable to use one steel or temper for working gages and another for final inspection when the work has been cleaned.

L. A. Dause, Cadillac Motor Car Co., Detroit, stated that tests at the Cadillac plant showed that those run by repeated applications of the same test surfaces to the gage do not wear the gage nearly as rapidly as do applications of new surfaces to the gage, the increased wear to the latter being due to the roughness of the grinding wheel. Their tests positively demonstrated the superiority of file-hard gages over file-soft ones. With Stellite gages "loading" is seldom encountered. Chromium plated gages also have a marked resistance to loading.

A. H. d'Arcambal, Pratt & Whitney Co., said that the wear test machine should give reliable results, but that the results obtained do not check with gages in actual service. Plug gages made of high-carbon tool steel and incorrectly hardened by oil quenching would give very little service under working conditions, as they would not take as high a polish as file-hard gages. Gage makers, he said, are primarily interested in the comparative wearing qualities of file-hard gages with gages correctly hardened but drawn to 425 to 440 deg. Fahr. instead of the 360 deg. Fahr. draw.

Mr. French, in concluding the discussion, said that a marked superiority was found in chromium-plated gages when properly lapped, but the results were poor when the gages were not lapped. He pointed out that he was not recommending file-soft gages at this time, but only showing the results of tests.

English Practice on High-Speed Steel

F. C. A. H. Lantsberry, William Jessop & Sons, Sheffield, England, presented a lengthy paper on "High-Speed Steel," which attracted attention as probably indicating good metallurgical practice in England.

Crucible steel is preferred by the writer to electric steel, even though it may cost 50 per cent more, because the former starts with purer raw materials and the latter is hard to control. Judging from the American comment, the repute of electric steel is steadily growing; large tool manufacturers now find it easier to get uniform and satisfactory tool steel from the electric furnace than the crucible melter. Steel makers also insist that it is good metallurgy to do some of the refining in the steel making operation rather than

P. G. McVetty (at left), mechanical engineer, Westinghouse Electric & Mfg. Co., together with N. D. Mochel, presented a paper on the tensile properties of stainless iron and other alloys at elevated temperatures. For a time Mr. McVetty was in charge of research for the Leather Belting Exchange and later an assistant superintendent of the south side works of the Jones & Laughlin Steel Corporation

Victor E. Hillman (at right), director of chemical research, and E. D. Clark, metallurgist Crompton & Knowles Loom Works, Worcester, Mass., were authors of a paper entitled "Cyanide Brittleness." During the war Mr. Hillman was affiliated with the Savage Arms Corporation as chief of the metallurgical staff

to expect to do it all in preliminary smelting. Accepted English analyses follow:

	14 Per Cent Type	18 Per Cent Type	"Super" Steels	
Tungsten	12.0 to 14.0	16.0 to 18.0	17.9	19.0
Carbon	0.60 to 0.65	0.60 to 0.65	0.71	0.77
Chromium	3.5	3.5	3.8	3.8
Vanadium	0.20 to 0.30	0.20 to 0.30	1.3	0.6
Molybdenum	.....	.....	..	0.7
Cobalt	.....	.....	..	5.4

Mr. Lantsberry noted that the 14 per cent tungsten steel ingots are 20 per cent cheaper than the 18 per cent, and tools made from them are well able to resist considerable stress while cutting. Therefore these steels make excellent twist drills, reamers and dies. (It may be remarked that the first two steels are quite low in vanadium, as compared to American steels, and also about 10 points low in carbon.)

In the author's opinion there is little chance of increasing the speed of present steels—indeed, he feels that this is hardly necessary, since cutting speeds of 150 ft. per min. are common in mild steel. Red hardness is now satisfactorily maintained up to 700 deg. C., and this is as hot as anyone would want to work a tool. Something may be gained by increasing the intrinsic hardness by getting a more uniform distribution of the carbide in the steel.

Several speakers, in comment, were of the opinion that a carbon content of 0.70 to 0.75 per cent would give a marked increase in cutting ability. A little more tungsten and a hardening temperature about 200 deg. Fahr. higher than that recommended by Mr. Lantsberry would also give a better red hardness without undue grain growth.

Hardening Light Metal Alloys

ALLOYS of the duralumin type are rather difficult to work and their commercial developments have been somewhat retarded by this characteristic, said Robert S. Archer, Aluminum Co. of America, Cleveland, in a paper entitled "The Hardening of Metals by Dispersed Constituents Precipitated from Solid Solutions." In view of the potentially great utilities of strong aluminum alloys, the Aluminum Co. of America, several years ago, undertook the production of new alloys. This work resulted in the production of two types of aluminum alloy of the strong alloy class having distinctly improved fabricating qualities. One of the new types referred to consists chiefly of aluminum and copper. The binary aluminum-copper alloys, especially when made from metal of ordinary purity, show very little age hardening at room temperature after the solution heat treatment. They are, however, susceptible to marked hardening by reheating at 212 to 347 deg. Fahr. (100 to 175 deg. C.).

The other type of alloy referred to consists chiefly of aluminum, magnesium and silicon. These alloys show distinct age hardening at room temperature after the solution heat treatment. The strength retained under these conditions, however, is not very great, usually well under 40,000 lb. per sq. in. In the laboratories of the Aluminum company it was found that the hardness, strength and elastic ratio of these alloys could be further increased to a marked extent by an artificial aging at about 212 to 347 deg. Fahr. By this means it was possible to obtain a tensile strength as high as 54,000 lb. per sq. in., a Brinell hardness of 120 and a yield point of about 40,000 lb. per sq. in.

In summarizing, Mr. Archer said that metals may be effectively hardened by highly disbursed particles within the grains, such as may be formed by supersaturated solid solutions. A typical process of hardening by this means consists in a solution heat treatment at a relatively high temperature followed by rapid cooling in a region of super-saturation, then by precipitation treatment or aging to permit the formation of a very fine precipitate. The precipitate tends to grow to a critical particle size conducive to maximum hardness, beyond which the hardness decreases.

Mr. Archer's paper is an elaboration of others which he and Dr. Zay Jeffries have presented in the recent past. The new paper, however, brings out particularly some recent developments in connection with magnesium and its alloys.

Interesting discussions were offered in writing by Dr. Paul D. Merica, director of research, International Nickel Co., New York; by R. S. Dean, Western Electric Co., Chicago; by O. W. Ellis, research laboratory, Westinghouse Electric & Mfg. Co., East Pittsburgh, and H. C. Knerr, consulting metallurgical engineer, Philadelphia. Space permits only an allusion to these.

Doctor Merica said that there is still controversy concerning the exact mechanism of the hardening phenomenon in some cases. One stumbling block facing the precipitation theory of the hardening of duralumin is the established decrease of conductivity during ordinary temperature aging of it. Mr. Archer makes some quite pertinent comments on this difficulty and raises the question whether we have a right to expect an increase of conductivity with decreasing solid solution concentration under all circumstances. But there are other factors which play some part in the conductivity of an aged sample of duralumin. Elastic strain affects electrical conductivity in the tensional axis. It appears most difficult to estimate the probable value, distribution or effect of these internal stresses, but it seems most probable that they exist, said Doctor Merica in conclusion, adding that he is compelled to join with Mr. Archer is questioning the absolute solidity of the conductivity evidence against the precipitation theory.

Francis J. Curran (at left), with Prof. C. G. Priester, University of Minnesota, offered a discussion of the mechanical and machining properties of an annealed cast iron. Mr. Curran was engaged as metallurgical engineer for two years for the Arrow Head Steel Products Co., Minneapolis, and later for the Associated Chemists, Minneapolis

Dr. Vsevolod Nicholas Krivobok (at right), bureau of metallurgical research, Carnegie Institute of Technology, Pittsburgh, is the author of a contribution entitled "Dendridic Crystallization and Grain Formation in Steels." The Government of Russia sent him to the United States as a member of an Artillery Commission in 1915-1917. He went back to Russia in 1919 as engineer in the metallurgical department, Ministry of Railways, Government of South Russia. In 1920 he returned to the United States

Other Papers of Notable Importance

Some of the other papers of commanding interest presented at various sessions of the meeting of American Society for Steel Treating are reviewed briefly in the following:

Stainless Iron at High Temperatures

A PAPER that attracted more than the usual amount of interest was one on "The Tensile Properties of Stainless Iron and Other Alloys at Elevated Temperatures." This was prepared by P. G. McVetty and N. D. Mochel, mechanical engineer and metallurgical engineer respectively, Westinghouse Electric & Mfg. Co., and was presented by the former.

The tests covered in the paper were made with medium carbon steel, 5 per cent nickel steel, stainless iron in the form of forged and rolled bars, cast manganese bronze, brass and Monel metal. Results that were obtained in short time tensile tests at high temperatures were shown on charts. In these the main tensile properties of the nine materials were compared in the entire range of temperature studied. The data indicated that annealed stainless iron of the grade examined has good tensile properties up to 752 deg. Fahr. without evidence of brittleness. Between 732 and 932 deg. the strength decreases more rapidly and the ductility increases. Hot rolled Monel metal up to 752 deg. shows good tensile properties, but it becomes brittle at 932 degrees.

The authors pointed out that the short time tensile tests cannot indicate the service conditions upon materials exposed to high temperatures. In this connection they referred to some of the long time tensile tests they had made. Results of long time tests of stainless iron were shown in tables. The tests showed that annealed stainless iron does not deteriorate as a result of exposure to stress and temperature for periods up to one month. Similar tests of heat-treated stainless iron showed that the ultimate strength and ductility are not seriously affected by such exposure for periods up to four and one-half months.

The authors found that the Martens mirror type extensometer gave good results in the measurement of extensions in short-time tensile tests, but it was almost impossible to prevent disturbances of this instrument when used for long-time tests. Consequently the Martens telescope was replaced by a specially designed projection apparatus with which it is possible to estimate millionths of an inch.

H. R. L. Templin, Aluminum Co. of America, in discussing the paper, said that tests have recently been made of aluminum at high temperatures and that a paper is being prepared on this subject. He did not find test specimens with threaded ends satisfactory for high temperature work and used a different form of test piece. He had made short-time tests of various alloys to show their tensile properties at high temperatures, but had not attempted long-time tests. H. J. French emphasized the great practical importance of "creep" in its relation to tensile tests. He also pointed out that the load-carrying ability of steel at different temperatures is a matter of great interest.

In closing the discussion, Mr. McVetty said that because of the variation in test bars he had adopted a system of magnetic testing of test bars and those that show much variation are discarded. The proportional limit shown in short-time tests, he said, is good evidence of the maximum load-carrying capacity in service. In making tests he pressed the thermocouple against the test piece, which he regarded as preferable to pitting the thermocouple in the test piece.

"The Decomposition of the Austenitic Structure of Steel" was discussed in a paper prepared by Dr. O. E. Harder and Dr. R. I. Dowdell, University of Minnesota, which was presented by the latter. The authors had handled this subject in six sections, but only the last section was preprinted. In this part of the paper the authors used the results of their investigations as the basis of a proposed theory for the hardening and tempering of steel.

Brittleness Due to Cyanide

"Cyanide Brittleness" was discussed in an interesting paper by V. E. Hillman, director of chemical research, and E. D. Clark, metallurgist, the Crompton & Knowles Loom Co., Worcester, Mass., which was read by Mr. Hillman. Low carbon steel cyanided, he said, is extremely brittle if the core is intact, but when the core is removed it shows extreme ductility. Results of various tests were given and graphs and photographs shown. Six standard test specimens were immersed in a cyanide bath at 1500 deg. Fahr. for 15 min. and then quenched in water. This was repeated at 30, 45 and 60-min. intervals. These showed that the brittleness of the metal becomes more pronounced as the period of cyaniding increases. The percentage reduction of area decreased from 62 to 0 per cent. A 30-min. cyanide treatment, which conforms to shop practice, resulted in a reduction of area of only 4 per cent. The tensile strength, which is an index of brittleness, increased as the period of immersion was prolonged.

Similar results, to a less degree, were obtained from oil quenching. Other test bars were cyanided, the case was removed by turning the specimens in a lathe, then they were reheated and quenched. These showed by virtually no change in the percentage reduction and in the tensile strength that no brittleness was in evidence. The case of other specimens after cyaniding was removed by grinding, but ductility was still in evidence. The opinion was advanced that the apparent brittleness of the core with the case intact might be due to the strained condition of the metal caused by quenching.

Consequently specimens were cyanided, quenched and reheated. Notwithstanding the drawing treatment, brittleness was still in evidence. The data indicated that a piece of steel after cyaniding and quenching in water will break readily when subjected to stress, but when the case is removed the same piece possesses ductility. Therefore the brittleness in the core is apparent, not real.

Among the conclusions were that breakage of cyanided products is developed by the extreme brittleness of the case which causes an incipient crack when sudden shock or a steady load are applied, and when inchoate fracture is once effected, breakage is rapidly transmitted through the core because the crystals of the hard surface and tough interior are mutually involved or intertwined.

In briefly discussing the paper Stanley P. Rockwell, Stanley P. Rockwell Co., Hartford, Conn., stated that he regretted that impact tests were not made and that an analysis was not made for nitrogen. He thought there was no doubt that cyanided steel increases in nitrogen and that nitrogen is a harmful element when introduced in quantity.

C. A. Lampard, Yale & Towne Mfg. Co., Stamford, Conn., said that he had had experience in case hardening high phosphorus steel, but he had to come to low phosphorus steel, running 0.15 per cent in carbon, to eliminate brittleness. Mr. Hillman replied that he got rid of much of the hardness by quenching in oil.

Malleable Iron

Three papers of a theoretical nature were presented by H. A. Schwartz and H. H. Johnson of the National Malleable & Steel Castings Co., Cleveland, and by Prof. H. P. Evans and Anson Hayes of Iowa State College. These had to do with the transformations in the stable and meta-stable iron-carbon diagrams, especially as affected by the presence of a third element like nickel, silicon or oxygen.

The mechanism of the change from white iron to malleable iron is not well understood, and the attention now being given to it by physical chemists of marked ability will undoubtedly bring results which can later be utilized to advantage by the malleable industry.

Heat Treatment Furnaces

Two very efficient furnaces of the continuous type were described by W. A. Timm, Western Electric Co., and by E. R. McPherson, Packard Motor Car Co. The former has installed a double tunnel car bottom furnace for box annealing small iron parts for electromagnets.

The material progresses through the furnace in opposite directions on the two sides; the pre-heating zone in one is therefore alongside the cooling zone in the other tunnel. At the middle of the furnace is a common chamber for the soaking heat. Heat is supplied by banks of electric resistors suitably placed in the walls and roof of the furnace, and in the car bottoms to which current is brought by a third rail contact; 160 kw. of power are required. It requires 18 hr. for a car to pass through the furnace. The furnace contains six cars at all times, each of which carries 1500 lb. of work and an equal weight of box. The installation thus has a capacity of 8 tons per day. A year's operation shows that it produces better work at a lower price and with far better working condition than the 11 oil-fired furnaces which it replaced.

The Packard installation comprises two continuous furnaces, 25 ft. long, 4 ft. wide, for carburizing gears and pinion shafts. Each furnace is equipped with four

High Lights at the Chicago Convention

SPLENDID array of technical papers bringing up to date the latest developments in steel treating and related subjects.

A steel and machine tool exposition excelling in comprehensiveness and size any previous ones.

The display of machine tools made up nearly 50 per cent of the total space and was nearly double that of a year ago.

The attendance at the technical sessions and particularly at the exposition. was large. All records at the latter were greatly exceeded.

Several noted German, French and British scientists were present.

Plant visitations were a feature of the week's program. These were scheduled for morning and afternoon of each of the five days and included 13 separate trips to plants of 15 or more companies. Chicago offers special advantages in its steel plants, foundries and heat-treating departments of various manufactories.

With T. V. Purcell, Peoples Gas Light & Coke Co., Chicago, as general chairman and A. G. Henry as general secretary of the Chicago convention committee, every phase passed off smoothly and satisfactorily. The Chicago chapter and its co-workers deserve the highest praise for the complete arrangements made for the largest convention and exhibition of its kind ever held. Of a total of 4000 members of the society, 2025 were registered.

No sooner have the doors closed on the 1926 convention than preparations are set in motion for the one in 1927. This is scheduled already for the week of Sept. 19 at Detroit with the exposition located at Convention Hall, where 100,000 sq. ft. will be available.

The society's secretary, W. H. Eisenman, after weeks of arduous work, has been granted a leave of absence of about six weeks. He will sail for Europe on Oct. 9, visiting England, Germany, France and other countries, where he expects to meet some of the leading metallurgists in various industrial centers.

Attendance at the steel and machine tool exposition exceeded the expectations of the most optimistic promoter. The total attendance is placed at 80,000. This was particularly true on the last evening, when the crowd was very large. The quality of the attendance this year was a matter of comment—better than on most former occasions.

A central figure at several of the technical sessions was the distinguished German metallurgist, Dr. William M. Guertler. Brought over by the society to deliver the first E. D. Campbell memorial lecture, he presented two other important addresses, one on light metal alloys and one on the hardness of metals at the symposium on hardness.

Among other foreign visitors interested in the way American metallurgists conduct conventions was a French leader of industry, M. Pierre Aubert, and a British educational leader, T. Henry Turner. M. Aubert is of the firm of Aubert & Duval, Paris, and is in this country in connection with the granting of an agency to the Ludlum Steel Co. for licensing the use of the new nitrating surface hardening process developed by Fried. Krupp & Co. Mr. Turner is a lecturer in metallurgy at the University of Birmingham, Birmingham, England, and the son of the famous Professor Turner of the same institution. The latter is to receive one of the honorary medals at the foundry convention in Detroit next week and his son will accept it for him.

With Judge E. H. Gary and Charles M. Schwab added to the list of honorary members, the total is now eight. They include also Sir Robert Hadfield, London, England; Dr. Albert Sauveur, Cambridge, Mass.; Dr. John A. Mathews, Crucible Steel Co. of America, New York; Henri Le Chatelier, Paris, France; Kotaro Honda, Sendai, Japan, and Charles F. Brush, Cleveland.

An interesting side-light on the history of the exposition movement was the presence here and there of banners "Pioneer Exhibitor Chicago 1919." It develops that nearly half of the original 65 to 70 exhibitors at that pioneer attempt in September, 1919, were represented among the 350 to 360 this year.

A. G. HENRY

T. E. BARKER

A. F. BOISSONEAU

IN 1919 the American Steel Treating Society was formed in Chicago with T. E. Barker as president, A. F. Boissoneau as vice-president and A. G. Henry as secretary-treasurer. It was these men who, with W. H. Eisenman, launched the convention and exposition which made such an impression at that time in the Seventh Regiment Armory, here shown. Seven years later the same men were re-elected to the corresponding offices of what is now the Chicago chapter of the American Society for Steel Treating—a fitting tribute to these pioneers—on the eighth anniversary of the founding of what has come to be a remarkably flourishing national organization

oil burners at the end where the charge enters. Products of combustion circulate through the second half of the furnace, maintaining it at a temperature guaranteed to be uniform within 10 deg. Fahr. Waste gases then pass through a recuperator, heating the air used for combustion. Each furnace is built to pass 80 boxes of charge per day (gross weight 250 lb. each), which capacity has been considerably exceeded. A thermal efficiency three times as great as a batch-type furnace is also claimed. Tables showing relative economy are given, indicating a yearly saving of $45,000 with the new equipment, a return of 80 per cent on the investment.

Annealed Gray Cast Iron

Prof. G. C. Priester of University of Minnesota and F. J. Curran of Arrow Head Steel Products Co., Minneapolis, presented an extended study of the mechanical and machining properties of annealed cast iron pistons. Samples were taken from heats in commercial production, annealed at about 1500 deg. Fahr., and furnace cooled. It was found that the matrix, which formerly was well developed pearlite, then became substantially pure ferrite, the liberated carbon migrating to the existing graphite flakes. (The iron contained 0.65 Mn., 1.30 Si., 0.30 P., and 0.10 per cent S.) After this treatment the machinability is much improved: about three times as many can be rough turned on one tool, and up to 13 times as many finish turned. Other properties are compared in the following table (the average of many concordant tests:

	As Cast	Heat Treated
Modulus of elasticity	13,700,000	12,500,000
Transverse modulus of rupture	60,500	43,100
Tensile strength	24,900	16,000
Brinell hardness	174	107
Shearing strength	32,500	20,500
Compressive strength	101,500	60,600

In the discussion it was brought out that, while annealing of gray cast iron doubtless increased its machinability, it decreased its strength considerably, and consequently should be used with caution on castings which were expected to take considerable stress. Doubt was also expressed about the wear-resisting qualities of annealed irons—experience at the Ingersoll-Rand factories indicating that 0.75 to 0.80 per cent combined carbon is desirable for wear resistance. Harder castings, if annealed, always come out too soft, so annealing has been discarded by them as a routine practice.

On the other hand, it was reported that gray cast iron bushings, annealed to 1650 deg. Fahr., have given very satisfactory service for high-speed shafting, thus establishing an excellent wear-resisting quality.

Oil Hardening Non-Deforming Tools

Addition of the small amount of alloy, that is 1.50 per cent manganese or 1 per cent manganese with about ½ per cent chromium, causes steels which are generally known as "oil hardening non-shrinking steels or non-deforming steels," to harden deeply with the mild oil-quench, said E. C. Bain, co-author with M. A. Grossmann in a paper the title of which was "The Nature of Oil Hardening Non-Deforming Tool Steels."

It is believed by the authors that the persistence of austenite and the manner of its decomposition, as much as any other single property in a steel, provides an index of its ultimate nature. The effects of quenching temperature upon the hardness of these steels, when quenched in oil, is slight. It appears that as soon as a piece has been heated sufficiently above the critical temperature to render it wholly austenitic and to produce a sufficiently high cooling rate through this critical temperature in the oil bath, then a hardness is established which cannot be greatly increased, or decreased, by heating to a higher temperature. This observation leads the authors to come to the conclusion that increasing the quenching temperature does not increase materially the amount of austenite preserved, and that the hardness of martensite-austenite mixtures in this

Dr. Anson Hayes (at left) is joint author with H. P. Evans of a paper entitled, "Graphitizing Behavior of Iron Carbide in Pure Iron-Carbon Alloys in the Critical Range." Dr. Hayes is professor of physical chemistry at Iowa State College, Ames, Ia., and has been directing research work on phases of the subject discussed for a number of years

H. A. Schwartz, author of papers on malleable castings problems, has been manager of research of the National Malleable & Steel Castings Co., Cleveland, since 1920, following other connections with that institution dating from 1902. He is an active member of a number of technical bodies and the author of numerous papers devoted to malleable casting practice

particular steel is not greatly affected by change in the proportion of these two constituents. Although it so happens that these hardness measurements were made by the authors entirely upon the manganese type of hardened steel, nevertheless in their opinion identical results would have been obtained from the chromium type of steel. Examination under the microscope, and the fracture of many specimens of these steels, reveals the fact that it is an extremely deep hardening material.

So far as is known the only structural change in steels of this character which can account for an expansion upon reheating is the change of austenite to alpha iron. Evidence is quite clear that the martensite of such steels is progressively decomposed into troostite, sorbite and so forth, more and more rapidly as the steel is reheated to temperatures above 200 deg. Fahr. Reheating of the steel to higher temperatures causes a rapid increase in impact strength, corresponding approximately to the condition of annealed steel.

It is the authors' opinion that the hardening of this type of steel was not modified materially by the quenching temperature employed and that these steels are softened by drawing back in much the same manner as carbon steels, irrespective of quenching temperatures. A secondary hardness has not been observed. The dimensions of these steels, as, for instance, in carefully made precision pieces, vary markedly with the drawing temperatures and, without sacrificing hardness, a proper drawing temperature can usually be applied so that the final size, cleaned of scale, is very near that of the original work.

New Process for Surface Hardening

A most interesting paper of a practical nature was presented by T. H. Nelson, Ludlum Steel Co., Watervliet, N. Y., "A New Process for Surface Hardening Special Steels," It was not pre-printed, but was read by the author.

The paper is a discussion of the new Krupp process developed by Doctor Fry, a research worker in the laboratories of the Krupp company in Germany. The process was described in THE IRON AGE of Aug. 5 under the title "Case Hardening with Nitrides," an abstract of the original discussion appearing in German. The new process is based, as in case hardening with carbon, on the phenomena of diffusion, but instead of carbon, nitrogen in the form of ammonia, is allowed to penetrate the surface of the finished metal to be hardened, which must be a steel of special and suitable analysis. A temperature not exceeding 550 deg. C. is used.

Mr. Nelson states that when dealing with steels of suitable composition, and in particular with steels containing aluminum, the most effective barrier is formed to inter-crystalline penetration, and a surface formation can be seen of a complex nitrogenous nature which possesses exceptional hardness. The outer portion of the steel is hardened in actual treatment and does not require any further heat treatment of the material above the critical temperature or any subsequent quenching of the metal. The novelty of this system consists of a treatment which is carried out at a low temperature without requiring any further quenching.

An interesting and very important aspect of the metal hardened by this process, says Mr. Nelson, is the fact that the case produced will retain its hardness when submitted to reasonably high temperatures.

Mr. Nelson answered several questions, among which was one regarding the composition of the special steels which are only suitable for this process. He indicated that chromium was a most favorable factor, averaging from 1.25 to 1.75 per cent, that aluminum should be present in quantities varying from 3 per cent down to 0.50 per cent. The carbon may have various ranges, a common one being 0.08 to 0.15 per cent and even higher. He explained that the presence of titanium was believed to be a favorable factor. As to the time necessary, 75 to 80 hr. was usual for ordinary work, with 15 to 25 hr. sufficient for small parts.

On Light Metal Alloys

Dr. William M. Guertler, Charlottenburg, Germany, who spoke at several other sessions, delivered at one session a paper, well illustrated with lantern slides, on "The Light Metal Alloys." He outlined some of the work that has been done by himself and associates in the development of some of these alloys, and, in particular, what is being accomplished in Germany in improving aluminum alloys. He pointed out that the most important groups of light metal alloys are casting alloys, malleable age-hardening alloys, bearing metals, electrical conductors and light metal solders. Each group must have certain special properties, but all must be resistant to corrosion. The binary, tertiary and higher aluminum alloys were discussed to show how these requirements are fulfilled, and in conclusion, the magnesium alloys.

The Iron-Molybdenum System

A notable contribution to metallurgical literature was a paper by W. P. Sykes, metallurgical engineer, Cleveland Wire Works, incandescent department, General Electric Co., Cleveland. It was entitled "The Iron-Molybdenum System," and represents some of the most important original work which has been done in the last year or two. Last February, at the annual meeting in New York of the American Institute of Mining and Metallurgical Engineers, Mr. Sykes presented the results of a similar investigation on the alloys of iron and tungsten. And in line with this same series was a paper by E. C. Bain, Union Carbide and Carbon Research Laboratories, Long Island City, N. Y., on the iron-chromium system.

Mr. Sykes's paper, which covers 32 printed pages, is an exhaustive discussion of the iron-molybdenum series. The carbon-free alloys of iron and molybdenum are described, including the equilibrium diagram of this system as determined by fusion temperatures and a study of the accompanying microstructures. Mr. Sykes calls attention to a notable feature of these alloys, one which is a eutectic at 36 per cent of molyb-

denum, melting at 2625 deg. Fahr.; also one which contains 53.4 per cent molybdenum and is a glass-hard alloy, containing no carbon. He discussed the temperature solubility relations which make possible a secondary hardness by ageing—a hardness equal to that of high-speed steel.

Miscellaneous Activities of the Society

THE major part of the time of the delegates and visitors was devoted to the technical sessions and to the exposition. But there were numerous other happenings of more than passing importance. Some of these are touched on in the following:

Gary and Schwab Honored at the Banquet

HONORARY memberships in the American Society for Steel Treating were bestowed on Judge Elbert H. Gary, chairman of the board of the United States Steel Corporation, and Charles M. Schwab, chairman of the board of the Bethlehem Steel Corporation, at the annual banquet held in the ballroom of the Drake Hotel, Chicago, Sept. 23. Mr. Schwab received his membership in person but Judge Gary, being unable to be present, was represented by E. J. Buffington, president of the Illinois Steel Co.

The past president's medal of the society was presented to W. S. Bidle, president W. S. Bidle Co., Cleveland, by President R. M. Bird, vice-president George F. Pettinos Co., Philadelphia. A founder membership was presented by Mr. Bidle to A. G. Henry, metallurgist Danly Machine Specialties, Inc., Chicago. High tribute was paid to Mr. Henry, to whose foresightedness was attributed the organization and the idea of a steel exposition in connection with the convention of the society.

The Henry Marion Howe medal was awarded to F. C. Langenberg, superintendent of laboratories, Watertown Arsenal, Watertown, Mass., by Col. T. C. Dickson, commandant at the Watertown Arsenal.

President Bird, through Mr. Schwab, presented the Lehigh Valley Chapter of the society with a bell and gavel, in recognition of its meritorious activities throughout the past year. This is the first award of this gavel which is to be given each year to the chapter which, in the judgment of the society's president, deserves it the most.

The attendance was one of the largest in the society's history. Bernard J. Mullaney, vice-president Peoples Gas Light & Coke Co., Chicago, was toastmaster.

Growth in Membership and Resources

MEMBERSHIP growth of 18 per cent for the year 1926 and an increase of net assets of $5,000, as of Aug. 31, bringing the total on that date to $93,225 are among the indications of the rapid growth and gain in strength of the American Society for Steel Treating.

The annual business meeting of the society occurred Wednesday morning, Sept. 22, in the ballroom of the Drake Hotel, Chicago. Metallurgical education should be extended and technical institutions should be enlisted in this work, said R. M. Bird, president of the society. The report of the secretary, W. H. Eisenman, showed that the growth in total membership of the society since 1920 is 2276. The gain this year is 637, or 18.9 per cent, which is the second largest yearly gain, even on a percentage basis.

This report also brought out the fact that at the board of directors meeting, at Cleveland, Sept. 16, a founder membership was awarded to Arthur G. Henry of Chicago, who was one of the original members of the Chicago chapter and who was largely responsible for the idea of holding an exposition in connection with the annual convention.

Reports of the various committees, which were read by the secretary, were followed by the report of Dr. Zay Jeffries, treasurer. Total assets of the society as of Aug. 31, 1926, were shown to be $93,225.35 as against $87,196.60 on Dec. 31, 1925. On Dec. 31, 1921, the assets stood at $16,520.90.

The first exposition held in 1919 at Chicago occupied 6500 sq. ft. This year at Chicago the floor space required was 80,000 sq. ft., and estimates now prepared indicate that at Detroit in 1927 not less than 100,000 sq. ft. will be occupied by the exposition.

The following names were proposed by the nominating committee: for president, J. Fletcher Harper, Allis Chalmers Mfg. Co., Milwaukee; for vice-president, F. G. Hughes, New Departure Mfg. Co., Hartford, Conn.; for secretary, W. H. Eisenman; for members of the board of directors, J. H. Need, American Rolling Mills Co., Middletown, Ohio, and L. D. Hawkridge, Boston. W. S. Bidle retires from the board of directors and will be succeeded by R. M. Bird, retiring president.

H. Kenneth Briggs was introduced as the new assistant secretary. Mr. Briggs was formerly a metallurgist on the staff of the Minnesota Electric Steel Castings Co., Minneapolis. The necessity for an assistant secretary is announced as the result of the

Officers of A. S. S. T. for Ensuing Year

R. M. Bird (at left), Philadelphia, is the present president; J. Fletcher Harper, metallurgist, Allis-Chalmers Mfg. Co., Milwaukee, is nominee for president; Frederick G. Hughes (at right), New Departure Mfg. Co., Bristol, Conn., is nominee for vice-president.

growth of the society and the broader range of activities constantly being assumed.

First E. D. Campbell Memorial Lecture

THE first Edward De Mille Campbell memorial lecturer chosen by the American Society for Steel Treating was Dr. William M. Guertler, a prominent German metallurgist of Charlottenburg. This was established by the board in memory of Professor Campbell of the University of Michigan, one of the honorary members of the society, who died last year.

The title of Doctor Guertler's lecture was, "On the Corrosion Resistance of Steels." He pointed out that all metals are crystalline and that a metallic crystal will resist a chemical reagent only when the bonds of the atom in the space lattice are stronger than the affinity to the reagent. If surrounded and protected the atoms of the parent metal, foreign atoms in the metallic crystal, in solid solution, do not lower the stability. Heterogeneous alloys are only as noble as the least noble constituent and may be less so in the presence of moisture. Pure iron has little resistance to many of the common reagents. Heterogeneous alloys of iron are less resistant than pure iron, although iron is capable of forming solid solutions with many elements, some of which are remarkably resistant to chemical attack. Chromium affords protection only by secondary effects.

A brief account of Doctor Guertler was published in THE IRON AGE, Aug. 5, page 393.

FREDERICK C. LANGENBERG, who received the Henry Marion Howe medal of the American Society for Steel Treating, awarded annually for the best paper presented in the preceding year, was appointed metallurgist in 1915 at the Watertown Arsenal, and since 1919 has been metallurgist, Ordnance Department, U. S. A. He is the inventor of a special heat treating furnace for casting high speed tool steel and of an impact testing machine.

To Promote Metallurgical Education

ONE of a series of luncheons on metallurgical education, held at each annual convention, convened this year as usual, with President R. M. Bird presiding. The discussion covered the work of universities and of the society itself in this field.

Dr. A. E. White, University of Michigan, Ann Arbor, introduced Professor Nelson of the department of English of that institution, who is a member of the committee of collegiate educators conducting an investigation of this subject. Professor Nelson presented a review of the situation up to the present time. The work of the chapters of the society was illustrated by T. F. Brown, chairman of the committee on education of the Philadelphia chapter. He read a paper prepared by H. C. Knerr of that chapter, giving an account of the work of that group in conducting its course at Temple University.

The Henry M. Howe Medal

THE award by the board of directors this year of the Henry M. Howe medal was made to Dr. F. C. Langenberg, metallurgist, Watertown Arsenal, Watertown, Mass. This is bestowed each year in recognition of the best paper presented before the society during the year. Doctor Langenberg's paper, thus honored, is the one he delivered at the Cleveland convention last year in which he discussed special work on gun forgings as affected by heat treatment and shrinkage. Last year, by a peculiar coincidence, Dr. H. H. Lester, another worker at the same laboratory, was the recipient. The first to have this honor was F. F. Lucas, metallurgist, Bell Telephone Laboratories, New York.

Machine Tools Feature Largest Exposition

WITH 360 exhibitors occupying approximately 85,000 sq. ft. of floor space, this year's exposition, held at the Municipal Pier, Chicago, was the largest in the history of the society. Satisfaction with the commercial aspects was general, exhibitors reporting sales and the marshaling of numerous interested prospects.

The marked growth of these expositions, held in connection with the annual meetings of the society, is emphasized by a comparison of the number of exhibitors and space at this year's affair with the records of the first one, held in Chicago in 1919, where 57 companies were represented and 6000 sq. ft. of floor space was occupied. The exposition held in connection with the society's seventh annual meeting in Cleveland last year had 187 exhibitors, occupying 45,000 sq. ft. of floor space, then regarded as a splendid achievement. This year's show exceeds last year's by some 173 exhibits and 40,000 sq. ft. of floor space, or 360 exhibitors and 85,000 sq. ft.

Display in Straight Line

A unique feature, making this exhibition different from previous ones, was the arrangement of the displays. Located on a pier 2260 ft. long, the exhibits were placed on either side of and between two aisles. The advantage of this straight-line arrangement, all on one floor, was that visitors were conveniently able to see all exhibits. The straight-line walk down one aisle and up the other was, of course, a little less than a mile.

The showing of machine tools was outstanding, the space occupied by these exhibits being 40,000 sq. ft., or nearly 50 per cent of the total. This is more than double the space taken by machine-tool builders last year at the Public Auditorium at Cleveland. At the latter exposition 19,500 out of 45,000 sq. ft. was occupied by the same class of exhibits.

As usual, the machines were demonstrated in actual operation on production work. They were for the most part of the latest design and have been nearly all described in previous issues of THE IRON AGE. A list of the companies represented and the tools in operation, as well as details of the displays of all other exhibitors, were published in THE IRON AGE, Sept. 9.

Comprehensiveness characterized this part of the exposition, the machine tools shown being applicable to the work of a variety of industries. Standard tools were in operation as well as specially tooled production units. There were a large number of exhibits of drilling and tapping machines, which were variously equipped for high production work. A large variety of grinding machines was shown, including surface, internal, disk, face, centerless, universal, tool and cutter and hob grinders. Several makers of turret lathes, screw machines, engine lathes, milling machines, planers, shapers and gear hobbers were represented, and several metal-cutting saws were demonstrated. Boring tools and machinery, pipe-threading machines, die sinking, broaching, lapping, polishing and thread-milling machines were among other tools. Makers of pneumatic and portable electric tools had attractive displays. Punch presses, punches and shears, forging machinery, hammers and welding equipment were also to be seen. There were also exhibits of metal parts, cleaning and drying machinery and a few displays of electric trucks and other materials handling equipment.

A large variety of small tools and gages was attractively offered, twist drills, milling cutters and other small tools being in several instances demonstrated in production operations. There were also displays of

ball and roller bearings, gears, chains, belting and lubricating devices and other equipment.

Heat-Treating Equipment Impressive

Considerable space was devoted to heat-treating equipment of all kinds, fuel-fired and electric furnaces being arranged largely together. The representation was imposing and easily exceeded former attempts. Much of it was in active operation. There were also exhibits of companies distributing carburizing compounds, as well as pyrometric and other heat-controlling and recording equipment.

Metallographic apparatus was displayed, as well as hardness testers and universal testing machines. The care with which these were arranged was a feature.

Many of the large and small steel producing companies were represented by carefully planned displays. Among these were the makers of tool alloy and other high-grade steels. Particularly prominent were several exhibits of rustless iron, demonstrating the decided progress made in the last year in the commercial production of this alloy.

Refractories and abrasives were notable among the exhibits, a number of companies having uncommonly informative displays. Several producers of special alloy iron and other metal castings were represented by displays of their new products.

Here and there were to be seen banners in the booths of various companies emblazoned, "Pioneer Exhibitor Chicago 1919," and indicating that that firm was one of the original participants in the first exhibition, seven years ago.

Discuss Production Problems

Gear Steels, Machine Tools, Inspection Methods and Conveyors Receive Attention at Automotive Engineers' Chicago Meeting

"HERE are some methods or devices that we have found to facilitate manufacture or improve the quality of our product." That may be said to be the unwritten preface to the papers and much of the discussion at the production meeting of the Society of Automotive Engineers, held at the Hotel Sherman, Chicago, Sept. 21, 22 and 23. The same spirit pervaded the plants visited, where heat-treating methods and equipment, machining and other operations were to be freely observed. Under such conditions, it follows that much of profit was to be gained by those attending the meeting.

There were four sessions, devoted to conveyors, gear production, inspection and machine tools, respectively. A brief account of some of the papers presented at the sessions is given below.

Being held concurrently with the eighth annual convention and exposition of the American Society for Steel Treating, many of the engineers took advantage of the opportunity to see the comprehensive exhibit of machine tools, heat-treating and other equipment being demonstrated on the Municipal Pier.

Outlines Gear Practice at Reo Plant

GEAR making practice at the plant of the Reo Motor Car Co., Lansing, Mich., was outlined by Walter G. Hildorf and John Bethune, of the Reo company, in a paper on "Gear Steels and the Production of Automobile Gears." The paper was presented by Mr. Hildorf at the gear production session, which was presided over by R. S. Drummond, vice-president of the Gear Grinding Machine Co., Detroit.

The production of satisfactory gears was stressed as one of the most serious problems confronting the automobile manufacturer. The choice of gear steel and its heat treatment is closely allied to that production problem. Radical changes in automobile gearing during the next few years were predicted.

The method of producing rear axle gears was outlined. The gear and pinion teeth are roughed or gashed in the usual manner on Gleason roughers, and the gears are finished by the usual spread blade method. The pinions are not finished in the usual way, but are put in a fixture on a small milling machine and a 3/16 in. keyway is cut in the stem. This fixture has a plunger which enters a tooth space, so that the keyway is cut in a definite relation to the teeth. The new method, called the duplex method, is regarded as an improvement both from the standpoint of production and of quality. Some of the advantages of the new method were mentioned, and it was said that experiments are being made to see what can be done by cutting the gear in the same manner.

After roughing, the ring gear teeth are chamfered on the large end, a vertical hobbing machine with special hob being used. It is considered better to do the chamfering before the teeth are finished, because it might raise a burr on the tooth profile.

The gears and pinions are run in a bevel gear testing machine and corrections made in the usual way, excepting that with the duplex method, the running position of one side of the tooth can be changed without disturbing the other side. Pinions are burnished on a Gleason machine without any oscillating movement of the pinion. The gears are then heat treated, after which the pinion and gear are ground, the gear being ground on the back and in the bore. The gears are put in pairs on a testing machine and then lapped on a lapping machine. The gears are then again checked for tooth bearing and sound.

Some improvements which it was thought should be incorporated in rear axles and gear construction were taken up. One suggestion was that the pinion should be straddle mounted, because there is then less tendency for the pinion to tip up and throw the bearing to the large end of the teeth, which is destructive to them. In the case of hypoid gears the straddle mounting was said to be still more desirable.

A section of the paper was devoted to transmission gears. Experiments have been made in an attempt to obtain a greater degree of quietness. It was stated that a decided decrease in sound was obtained by the use of finer pitch gears. How far this decrease in pitch can be carried and what degree of quietness can be attained without decreasing the life of the transmission has not been determined. It was said to be evident that to get the greatest degree of quietness every effort should be made to increase the number of teeth in contact and improve the profile and tooth spacing.

Selection of Proper Gear Steel Difficult

The discussion of gear steel and its heat treatment by Mr. Hildorf was received with interest. Selection of a proper gear steel is quite difficult, he pointed out, because of the many variable factors, such as loads, ratios, pitch, long or stub teeth, etc.

Slow heating of gears for forging, so that they will be heated uniformly throughout their cross section was advocated. In connection with preliminary heat treatments, it was said that the practice with regard to S. A. E. 3250, 5150 and 6150 oil hardening steels is to heat to 1550-1575 deg. Fahr. (somewhat higher for S. A. E. 6150); quench in oil; and then draw at

1350-1375 deg. Fahr. This was said to give a Brinell hardness under 217 and a structure which machines well. It also brings the gears in condition so that they will go through the final heat treatment with practically no warpage. A satisfactory treatment for the S. A. E. 2315 carburizing steel was said to be heating to 1550 deg. Fahr., holding the gears at heat 1½ hr., and air cooling. The hardness will be about 179 Brinell.

Final heat treatments were discussed, and in regard to oil hardening steel (S. A. E. 3250 and 5150), the authors state that they believe it safe to say that the cyanide treated gears will wear better, will be somewhat noisier and have a different sound than the electric-furnace treated gears.

In carburizing steels, it was said that good results can be obtained from S. A. E. 2315 steel by quenching in oil from 1460 deg. Fahr., this treatment giving the highest impact value. An advantage of the single heat treatment also is that the gears do not warp as much.

Some of the precautions taken to overcome warpage were outlined. Wherever the shape of the gear permits, the forgings should be upset. The preliminary treatment should be such that the gears will not only machine well, but will go through the final treatment with minimum warpage. The final treatment should be carefully worked out, particular attention being paid to maximum temperature and rate of heating. The quenching medium and methods of quenching are important, and the abnormality of steel also has its effect upon warpage. Research has been conducted at the Reo plant in an effort to determine the causes of variations in machining, in physical properties and in service. A report of this work will soon be published.

The fracture testing of steel, described by Mr. Hildorf in his article on "Improvements in Automotive Steels," in THE IRON AGE of Nov. 26, 1925, was briefly outlined. It has been found, he said, that crystalline and fibrous steels do not machine alike, even though the Brinell hardness is the same.

Grain Size Inherited From Steel Mill

Grain size of steel was also taken up, it being pointed out that grain size varies greatly from heat to heat of steel, and to a lesser degree in the same heat. It does not seem possible by ordinary heat treatment, said Mr. Hildorf, to bring grains of different samples to the same size and keep them there. Some are naturally large and grow readily, while others seem to be naturally small and to remain small. Grain size was characterized as an "inheritance," a particular grain size being put in at the mill when the steel is made. The inherited grain size, it was pointed out, can be changed temporarily, but given a chance, it will go back to its original size. From what has been done at the Reo plant, it was said that it seems that large grained steel is always more brittle than fine grained steel, that the smaller grained material has a wider hardening range. If we are to have a steel with a naturally small grain, it must be made such at the steel mill, said Mr. Hildorf.

Considerable discussion followed the presentation of this paper. In regard to the statement that cyanide gears have a different sound and are noisier, Mr. Hildorf explained that with the S. A. E. 3250 and 5150 steels, their experiments have found it to be true. He said he was not prepared to say that the same holds true of other steels. Regarding noise in gears, it was pointed out the mounting of the gears is an important factor.

At the same session a comprehensive paper on the use of the hob generating method of cutting transmission and other automobile gears was presented by F. G. Eberhardt, Gould & Eberhardt, Newark, N. J. The title of the paper was "Automobile Gear Production," and the author, Charles L. Cameron, of the Gould & Eberhardt company. The production of various classes of work was shown by slides.

Failure of Machines in Production Line Costly

SOME suggestions as to how breakdowns of machine tools in the production line can be avoided were made by E. R. Stoddard, superintendent of tools, dies and maintenance, Studebaker Corporation, South Bend, Ind., in a paper in "What Goes Wrong With Machine Tools in Production?" Mr. Stoddard's paper was presented by E. A. Longwood, plant engineer of the Studebaker company, at the machine tool session of which W. G. Careins, production engineer, Ajax Motors Corporation, Racine, Wis., was chairman.

Failure of machine tools in the production line was stressed as serious and costly. It means that not only the particular machine which fails sustains loss of productive hours, but the entire line doing previous or subsequent operations must be halted until the repairs are made, frequently making the aggregate loss of productive hours large and expensive. Assuming production at the rate of 400 cars per day and a net profit of $100 per car, the direct cash loss to the corporation was shown to work out something like $4,000 per hr. A bank of parts is carried to tide over an emergency, but sometimes there is no bank ahead.

The question "What has been the direct cause of most machine failures?" put to men directly in charge of maintenance during the past seven years at the Studebaker plant, brought out the following answers, the importance of each cause being in the order given: (1) Lack of lubrication; (2) overloading and carelessness, and (3) poor design or construction of the machine tool.

Adequate Lubrication Prevents Breakdown

Machine tool builders, it was stated, could markedly reduce the number of failures of machine tools by providing positive force feed lubrication to all high-speed parts, and providing manifold oilers with sight feed. Many failures, due to lack of lubrication, are due to oil holes being scattered all over the machine. It takes considerable time to oil properly and the operator being on piece work is not apt to give the tool the necessary attention. Some part is not getting oil due to oil hole being covered with chips or grease and the operator does not know of the existence of such holes. Where oil holes are scattered and covered, it takes considerable time to oil properly.

Another lubrication recommendation was the bringing of copper tubes from the part to be oiled to one or more central points for oiling with a can or gun. The providing of liberal size self-oiling loose pulleys on machines driven from the line shaft, capable of 24-hr. run without refilling was also recommended. It was also recommended that all oilers be provided with a trap or guard to prevent chips or other foreign substances from getting into the bearings.

In discussing failures due to overloading, dull tools and carelessness, it was pointed out that production foremen and operators could reduce failures from this cause by seeing that all work is clamped securely in the jig or fixture before the machining operation begins, and also by seeing that machines are kept free from chips or surplus stock that might cause jamming. Cutting tools should be kept sharp, and castings or forgings that are too hard or contain an excess amount of stock should be removed from the machines. Wrenches, bolts, clamps and other loose pieces that by vibration might fall into the moving parts should be kept off the machine.

Preventing Failure a Joint Responsibility

Machine tool designers, it was stated, would materially aid in minimizing shut downs by providing interlocking handles or clutches and by furnishing shear pins to prevent excessive load being put on the machine. The machine should be designed so that it would free itself easily from cuttings, keeping chips away from ways, lead screws and other parts. It was said that where standard machine tools are furnished for a specific operation, all moving parts not required

for the specific operation should be removed and sent in with the machine tools in a separate container.

The responsibility of keeping machine tools running continuously is a joint responsibility, to be shared by the machine designer, the machine builder, the foreman of the department in which the particular tool is used, and the operator in charge of the machine, said Mr. Stoddard in concluding his remarks.

In the discussion, Mr. Stoddard said that the shortcomings of machine tools at his plant was made known to the builders and that machine tool builders were always very much interested in taking steps to prevent failure of their machines in production. E. F. Du Brul, general manager, National Machine Tool Builders' Association, spoke of the increasing necessity of transferring skill from men to machines, and showed the need of applying this to lubrication, in transferring the skill of men to lubricators.

Discusses Advantages of Special Purpose Machines

Advantages of machine-tools designed for specific jobs were outlined by O. C. Kavle, Manufacturers Consulting Engineers, Syracuse, in a paper on "Fitting the Machine Tool to the Job."

Mr. Kavle stressed the importance of preliminary analysis of the operations involved on a given production job, and adapting standard machines or designing and building special machines for doing the work. Several examples of adapted and special machine tools designed to speed up production were shown by means of slides and the use and design of these machines were outlined.

It was stated as his belief that the automobile industry has come to that stage where radical changing of design is becoming less each year, and with this, the production manager can consider more simplified production in his plant. The tendency in many cases, said Mr. Kavle, has been to buy large complicated stock machines to perform operations that could be done on much simpler units, the use of which would not only effect savings in power required to drive them, but would also save in floor space.

A section of Mr. Kavle's paper was devoted to lapping of engine cylinders. "We never have considered it advisable to use any cylinder bearing surface or any crankshaft or plain bearing that rotated or that received anything like the severe service in a gas engine, without lapping the bearing surface," he said. "We are satisfied that lapping more than repays for the time spent in the operation. . . . Failure to lap the bearing surfaces is the cause of many shortcomings now common in many engines." It was said to be a mistake, however, to think that errors in machining can be corrected by lapping. The use of wooden laps for the final finish was also mentioned.

Discussion of this paper centered around the honing of cylinders and the use of diamond method for the rapid and accurate sizing of holes, particularly in babbitt and bronze. A light cutting oil used as coolant was said to increase the life of the diamond materially.

Sessions Devoted to Inspection and Conveyors

SIX papers were presented at a session devoted to inspection methods and devices.

Methods of increasing the output per inspection man-hour by time study of inspection operations and, where possible, by putting inspection operations in a production line were interestingly discussed by A. H. Frauenthal, Chandler-Cleveland Motors Corporation, Cleveland.

A time study route sheet for the inspection of cam rollers was described and the inspection operations illustrated. A method of inspecting size and roundness of small holes in these rollers, stressed as superior to the plug gaging, was outlined. The advantages of time studies in this work were listed, and the objections stated to the indiscriminate preparation of inspection route sheets for all jobs. Production line inspection was taken up in the last part of the paper.

Two inspection devices, one a rough inspection fixture for a cylinder and crankcase cast en bloc and the other, a gage for checking the depth of combustion chambers in cylinder heads, were described by A. R. Fors, Continental Motors Corporation, Detroit. The use of fixtures for inspecting rough parts was advocated as not only of benefit to the machine shop but also of advantage to the foundry in providing a check on pattern wear and in reducing scrap loss.

Methods Used In Checking Small Gears

The attention paid to the quality of speedometer gears to obtain quietness, free action and long life was shown in a paper on "Means and Methods in Small Gear Inspection," by P. W. Rhame, A. C. Spark Plug Co., Flint, Mich.

Floor inspection is made, the inspector making his rounds every 30 min. The results of this tour are recorded on a special form so that there is a record of the results obtained by all the machines in the department. Distributing this report daily to the management, foremen, etc., was said to serve both as a check and as a means of stimulating interest. Ground gear cutters are employed and lantern projection method used to check them. Special gages have been developed, two of them, one for set-up and floor inspection purposes and the other for 100 per cent checking, being described in detail. A universal type of gage for transmission gears was also shown. The gages are checked regularly by gage checkers. In all cases, inspectors have detailed written instructions as to what to do and how to do it. This was emphasized as necessary because of change of personnel and is regarded as a valuable asset.

The inspection operations involved in the production of Knight engine sleeves were outlined by J. B. Scott, Yellow Sleeve Valve Engine Works, East Moline, Ill. Some of the manufacturing operations were described briefly in order to facilitate understanding of inspection requirements.

That part of inspection relying entirely on the judgment of individuals, was stressed in a paper by C. S. Clark, Packard Motor Car Co., Detroit, as the most uncertain problem of the inspection department. Mr. Clark referred to the judgment necessary in connection with that kind of workmanship that cannot be measured by mechanical means, but that must rely on one or more of the five senses. The experience of the Packard company in making use of the elementary principles of radio amplification to remove the doubtful judgment of an individual inspector on surface finishes was described. The instrument developed in connection with this research was shown by diagrams.

In an address on "The Human Gage," R. R. Todd, Oakland Motor Car Co., Pontiac, Mich., emphasized the importance of the human element in the gaging system. The discovery of an instrument that will indicate or accurately register noise, would, it was said, be a great asset in modern mass production.

Two Papers on Conveyors

The application of conveyors for automobile assembly and sub-assembly were pictured and explained in a paper by Paul Phelps and N. H. Preble, Mechanical Handling Systems, Inc., Detroit. This paper, on "Transportation by Conveyor," was presented by Mr. Preble at the opening session, Sept. 21. Eugene Bouton, Chandler-Cleveland Motors Corporation, Cleveland, was chairman.

Another contribution to this session was a paper on "Conveyors Used in the Automotive Industry," by C. A. Brock, Miller-Hurst Corporation, Detroit. Mr. Brock described types of conveyors employed to advantage in the automotive industry and took up some of the engineering principles of selection and design. Chains and the use of constant and variable speed drives were discussed. A monorail conveyor with automatic loader and unloader for handling truck and motor car frames through the wash, rinse, dry, paint and bake, was an interesting application shown, also a conveyor system in a motor foundry.

France Is Busy, but Low Hearted

American Management Mission Finds Impending Calamity in the Air—Industry Goes on in the Old Way, but Worker Does Not Fear Loss of Job

BY JOHN CALDER

TO an American observer this summer the fluctuations of the franc and France's feverish political atmosphere appear to be inconsistent with the rapid strides she has made industrially and physically from war paralysis to health. In some ways her losses would seem to have occasioned only greater vigor.

Though her remarkable activity may be founded upon a very insecure financial foundation, yet of that activity there can be no doubt; it is everywhere apparent. For example, in the whole of France in the month of July there were less than 500 unemployed persons. Eighty of these were reported from Paris, and this among a population of 39 millions, with an additional 3 million Italians, Poles and other needy nationals who have joined France's laboring forces. Unemployment for all practical purposes is unknown in debt-burdened but non-paying France, while Germany's and England's idle people are approaching two million each without reckoning the large voluntary abstentions due to strikes in the latter country.

Rapid Post-War Upbuilding

In the eight years that have elapsed since the Armistice French capital and enterprise have done much more than rehabilitate her war-wrecked agricultural and industrial districts. The capital, of course, was largely borrowed internally and externally by her Government against the day when "Germany would pay" for everything; and, while much was squandered in senseless "restorations" and fraudulent and padded claims, there is a solid and very creditable residue of sound economic value which will strengthen France productively when the smoke of the great explosion which is due has cleared away. Much wealth will have been redistributed, a large part of it unjustly as in all deflations; but a very solid productive, self-sustaining France will remain.

The present raw material deficiencies of France are domestic and power coal and metallurgical coke. These she has been accustomed to import to the extent of nearly one-third out of an annual demand of 80 million tons, and one-half of her importation has been the excellent fuel of England. It was natural, therefore, that the mines of the northeast of France should receive first attention, with the result that they produced 10 per cent more coal in 1925 than in 1913. At the same time the power fuel demand was minimized by hydroelectric developments capable of large future extensions, and the lesson of a 20 weeks' cessation of English supplies of coal is causing France to look more for steady external fuel supplies to continental sources regardless of nationalities.

Leading French Plants

Renault, Schneider, Thomson-Houston, Le Creusot and Citröen are typical of the best plant organization and management in France. They have often been described in detail and the object of this article is to dwell upon some features of French industrialism of the moment which give the managements concern. These and other successful large capitalizations keep in close touch with American practice and have usually liaison men in the United States by whom every industrial improvement is noted and critically considered. As a matter of fact they have little to learn from us which is adaptable to the requirements of a buying public that still detests the very idea of "mass production" and insists upon an element of individual preference in the most ordinary choices which we have long allowed the mass producer to dictate to us—for a price. This does not prevent the liberal use of the unrivaled American machine tools but these are no longer a novelty and tariff considerations are a stiff barrier at present.

Scientific Management Accepted as a "Science"

The writer and others of the American Management Mission had the privilege of spending some time with M. Freminville—the Continental "Management Division" representative of the A. S. M. E.—and found this charming gentleman an enthusiastic believer in the scientific approach to this subject which had been developed quietly in France in some details long before the epoch-making generalizations of the late Fred W. Taylor put the whole world under obligations to him. As a "science" it is still a matter of discussion in France, an academic matter for most, which has to hasten slowly in face of the natural individualistic tastes of producer and consumer alike. M. Freminville is wisely laying an educational foundation and endeavoring—as they are in the face of similar obstacles in Germany—to get demand, design and shop practice modified in the direction of a reasonable degree of standardization which will lead to intensified production. Mass production as such is not a present ideal in France and is opposed, as we have indicated, to the natural genius of the people who continue to carry their artistic preferences into fields where they have never even existed in America.

Citröen Takes the American Way

In Paris Citröen, the most enterprising and Americanized of the captains of industry using the illuminated Eiffel Tower to "tell the world," is one of the few machinery industrialists to take the risk of manufacturing on American mass production lines. He is concentrating his efforts on his popular 10 hp. car model which saves much in fuel consumption and heavy taxation over the double-powered Ford, not to speak of the tariff against the latter which is almost prohibitive at present.

The Ford chassis, however, still finds favor for light truck purposes to which Citröen's is not equal; but the latter has in preparation one capable of carrying 1 to 1½ tons with his more economical power plant.

In the textile districts of the north the despoiled mills, like the wrecked mines, are to be found in full operation with new and improved equipment and a greater output than before. The sole limitation is a scarcity of workers, a new phenomenon of after-the-war France.

In the iron and steel field, since the redemption of the rich Lorraine ore area, France is turning out over

7,000,000 tons of steel as against a bare 5,000,000 tons before the war.

Developing Water Power

A rapidly extending use of oil and water as sources of power seems likely to put a limit to the consumption of coal for that purpose and to make French manufacturers and municipalities correspondingly independent of importations. Systematic development of hydraulic resources is the order of the day and great schemes are afoot, while the relatively small sources are being carefully conserved and combined. In the Alpine ranges of the Southeast—particularly in Dauphiné and Savoie—many small but very regular high-head sources are being stored and massed by skillful engineering.

In normal times it is estimated that France must export at least half of her steel output and her chief concern is raw material sources not liable to interruption. At present she is short 6,000,000 tons a year of good metallurgical coke for her new capacity and is looking across her frontiers for partners regardless of nationality. While we were in Paris the organization discussions were going forward there for a huge steel cartel on the German model between France, Germany, Luxemburg and Belgium. The details were far advanced when it broke up to allow some Belgian concerns dissatisfied with their share of pooled orders to go home for conference. But more will be heard of it.

Docile Worker Disappearing

Unionism has always been weak in France. Men have combined, it is true, from time to time to force vociferously upon the attention of employers some real or fancied outstanding grievance but as soon as satisfied on the issue they have shown little cohesion and have practically disbanded. Until now the French workers have been more docile than those of England or the United States, though they have been less willing than German employees to come under the wing of the state. We found French employers this summer concerned and puzzled about their high labor turnover, something they never had known before.

Economically the French workers, and indeed the whole nation, *have never wanted enough things*, and have therefore been indifferent in bestirring themselves to get them. The secure job—sometimes a rather mean security, particularly if under the Government—was the objective, after which the employee dug himself in and the loss of the job was regarded as a dire calamity.

This is now a thing of the past. Under the reckless inflation the worker, just as others, tasted new luxuries and liked them. Owing to manhood shortage, services were at a premium and the French worker put himself up to auction to such profit that migration lost its terrors and became rather agreeable. Even a large importation—about 3,000,000—of rather inefficient foreign labor has not affected the situation, and we found directors and employment managers disconcerted, to say the least, at the disappearance of the docile skilled and permanent French employee and his replacement by a less able person who "was willing to consider a proposition."

More Interest in American Management Methods

In consequence there was a marked increase of interest in American personnel management and the discovery that the old type of "service director" will no longer do in the new industrial France. The worker has become mobile, he has found he can take the risk of throwing up his job for any reason or none at all, and has discovered that variety is the spice of life and security not the bugbear he had long imagined. Even the famous French apprentice of long discipline, poorly paid and of high final skill has become inoculated with the same virus and fares forth to see the world at an early stage, sometimes regardless of the obligations of his indentures. All of this enforces from French management an attention to industrial relations of a democratic type, instead of the old paternal variety, which is highly interesting to their young men and deplored by the old. Nevertheless, if managements will learn to cooperate with willing workers instead of commanding docile ones as of old they will have little difficulty in normal times.

The French Morale

Leaving the country toward the end of August, several weeks after her turbulent Chamber of Deputies had adjourned till December after accomplishing nothing, one comes away with the impression of impending calamity. It is a fatalistic calm that deceives the superficial observer. It is not the fortitude that saved Verdun. "What's the matter with France?" The people are low-hearted; though they never were so solidly intrenched industrially. The rentier is ready to slay the first man in authority who tells him his savings loaned to the Government are gone and lenders of a year or two ago everywhere realize that the longer "stabilization" of the franc is delayed the worse will be their lot. The "No Taxation" deputies want to save their seats in the next election; the rival statesmen want to evict each other.

Nobody cares for the interests of France. The impression made is that of complete irresponsibility in national affairs. In this situation the President is helpless. He has no possibility of interference, not even of moral influence. The one or two who tried that were quickly sent into the wilderness by a people intolerant of hierarchies. For that reason no Mussolini would be tolerated.

While her politicians are futile meanwhile, the people of France as a whole seem to be delivered at last from the old folly of believing that they would be individually relieved by reparations payments from all internal debt, even the extravagant, punitive scale of the reconstructions and of the after-the-war delirium: from the hope that France herself would escape by cancellation all external debt—nearly half of which is of post-war date. Instead they need and are beginning to demand a government which will impose the necessary taxation with justice and equity and tell the truth about the situation regardless of consequences to themselves.

If they get such a collection of statesmen and trust them, and attain a debt agreement abroad and liquidation at home, one feels they will have more friends in the world than ever before and a wholesome experience, and that the French industrialist need not fear the outcome.

Drop Forge Association Elects Officers

At a meeting of the American Drop Forge Supply Association, held at the Germania Club, Chicago, Sept. 22, Charles D. Harmon of the National Machinery Co., Tiffin, Ohio, was elected president of the organization. Jules Dierckx, Keller Mechanical Engineering Corporation, Brooklyn, N. Y., is vice-president, and A. L. Wurster, Heppenstall Forge & Knife Co., Pittsburgh, continues as secretary and treasurer.

A dinner preceded the meeting and was attended by more than 80. Mr. Dierckx was toastmaster, and speakers included Alex Motherwell, Chevrolet Forge Co., Detroit; Floyd Rose, Vanadium-Alloys Steel Co., Latrobe, Pa., and C. W. Heppenstall, Heppenstall Forge & Knife Co., Pittsburgh.

The Winchester Repeating Arms Co., New Haven, Conn., has brought out a new type of rifle, the barrel of which is made of stainless steel. It is said to resist corrosion effectively and may be used for a long period of time without need of cleaning.

Interior View of Ore Workings

Manganese Ore Deposits Limited

American Exploitation of Georgian Mines Important to Our Steel Industry —Primitive Methods Heretofore Employed

BY JOHN V. W. REYNDERS*

WORLD markets for manganese at present are supplied from four principal sources of supply, that is to say, Georgia (Russia), India, Africa and Brazil. The development of the Brazilian deposits was forced upon our steel industry during the war and is assuming less importance as the former supplies have become available. These deposits should form the natural reserve supply of manganese ore for the steel industry of the United States, and their present exploitation would appear to constitute a short-sighted policy. African ore, coming from the Gold Coast area, is assuming greater importance, something like 300,000 tons having been shipped during 1925.

Taking a large view, the manganese resources of the world seem to be extremely limited, adequate perhaps to supply the steel industry for a matter of 40 to 50 years. In the face of the extreme scarcity of native deposits, the high duty placed upon manganese ore and ferromanganese in this country is improvident and unintelligent.

It may be of interest to summarize briefly the situation in the Republic of Georgia, where an American manganese concession negotiated through the Harrimans is located.

This deposit, which before the war shared the world market with India for manganese ore, is located near Tchiatouri, district of Sharopan, in the Republic of Georgia now forming one of the constituent republics of the Soviet Government.

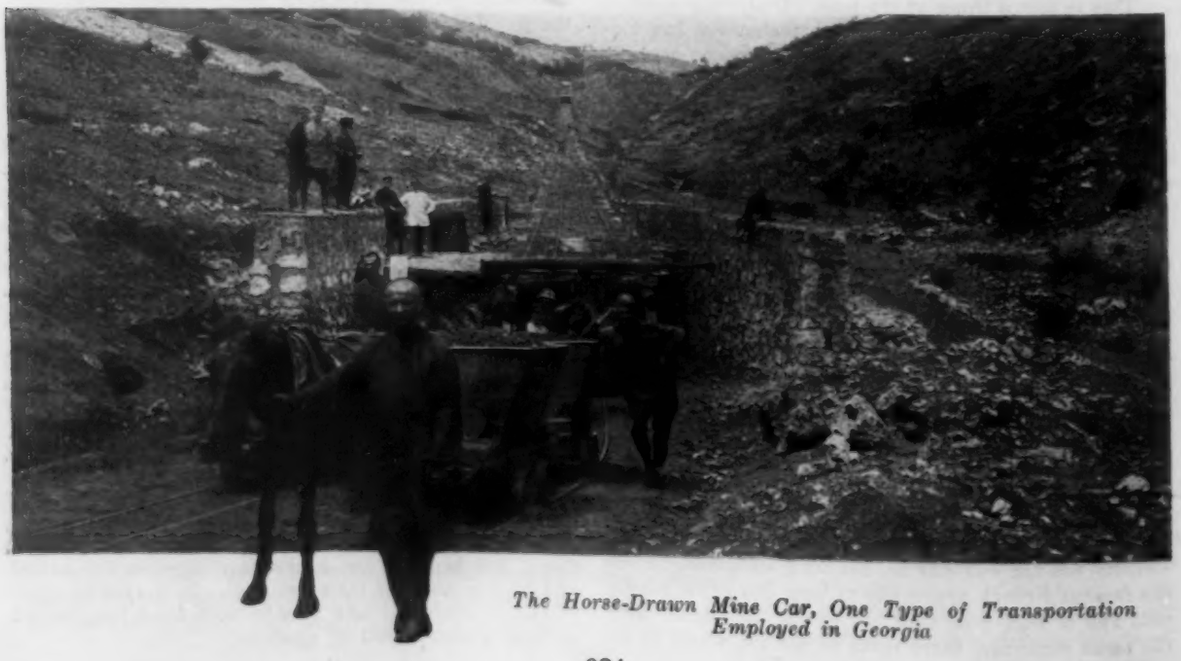
Tchiatouri is located midway between Tiflis, the capital, and Poti, the shipping port on the Black Sea, the distance in either direction being approximately 100 miles. The country is mountainous, surrounded by the snow-capped peaks of the Caucasian range. The mining district covers an area of approximately 5 miles square, being bisected by the Kvirila River, into which smaller streams flow, dividing the mining area into seven separate plateaus, each forming a mine district of its own with somewhat varying ore characteristics. The manganese deposit lies practically horizontal at an elevation of 600 ft. above the valley, with an average thickness of about 6 ft.

The outcrop, owing to the erosions caused by the various streams, is visible practically throughout the entire district, making exploration very simple. On the other hand, this condition has been the cause of unsystematic mining on the part of the peasants during the early years of exploitation, which to some extent complicates operations.

The methods employed in coal mining most nearly approximate the conditions to be met in Tchiatouri, the roofs and floors ordinarily being altogether favorable. About 80 per cent of the ore needs to be washed, an operation which heretofore has been carried out on a wasteful basis. One of the problems to be solved by the American administration will be to bring the washing practice abreast with modern developments, with the result that recoveries will be substantially increased.

Transportation from mine to washing plant and from washing plant to the narrow-gage railroad in the Kvirila River Valley has been largely effected by means of two-wheeled ox-carts handling 1 ton of ore in wicker basket bodies. The roads can only be described as trails built over a rocky base with little regard to grades. The life of an ox, or more generally speaking, a water buffalo, is not a happy one, alternating between the hot and dusty conditions obtaining in the summer time, and the intense black, sticky mud

*Consulting engineer, New York. Abstract of an address before the New York section of the American Institute of Mining and Metallurgical Engineers, Sept. 21.



The Horse-Drawn Mine Car, One Type of Transportation Employed in Georgia

to be negotiated during the winter or rainy season.

The speed of an ox-cart when in high gear is about 1¾ miles per hr. and the transportation cost about 65c. per ton mile. In recent years a small part of the transportation has been done by means of aerial trams, and this system is being extended throughout the camp by the American concessionaire.

From Tchiatouri to Sharopan, a distance of about 28 miles, the ore is transported on narrow-gage trucks, and there is transferred to broad-gage cars to be transported thence on the main line to Poti. The handling of cars to vessel at Poti, until now, has been accomplished practically by hand. The concession agreement provides for a modern loading plant at Poti, which will reduce the time of loading vessels from 10 days to about 10 hr., and the construction of a broad-gage line from Sharopan to Tchiatouri, making possible the shipment of ore without transfer in 50- or 60-ton cars.

The mining methods will be modernized, a new transportation system installed from mines to railroad, modern washing plants erected and housing facilities provided for the operators. The labor conditions are controlled by the unions, which form a part of the Governmental system. So-called collective agreements are made between the employers and union representatives, subject to revision every six months. Generally speaking, the provisions for welfare would not be regarded as onerous in this country, but considerable difficulty is introduced owing to restrictions surrounding the discharge of employees, a determination as to what constitutes a day's work, the matter of annual vacations with pay, etc. The working day consists of 7 hr., with extra compensation for any work carried on after that.

Loading Ore From Cars to Ship at the Black Sea Port of Poti. The buckets are rolled within reach of the ship's tackle and hoisted aboard

At Left—Procession of 25 Ox-Carts Loaded With Ore Crossing the Kvirila River. The weight of the ore would fill one-half of an American battleship car

Some of the Raw Ore Is Transported to the Washeries by Flume

Increased Business in Steel Furniture

WASHINGTON, Sept. 28.—Orders for steel furniture received in August from the "business group" were valued at $2,298,526, compared with $2,283,666 in July, and $1,989,476 in August, 1925, according to reports received by the Department of Commerce from 33 manufacturers. Shipments in August were valued at $2,342,615 against $2,149,546 in July, while unfilled orders were valued at $1,637,538 and $1,668,989, respectively.

For the eight months ended with August of the present year this class of steel furniture had been ordered to the value of $20,953,360 against $17,412,418 for the corresponding period of last year.

Orders received for steel shelving in August, according to reports from 16 manufacturers, were valued at $610,617 against $604,271 in July. August shipments of shelving were valued at $545,901 against $531,361 in July, while unfilled orders for the two months were valued at $662,148 and $602,134, respectively. Orders for shelving during the first eight months of the current year were valued at $4,929,097 against $4,286,868 for the corresponding period of 1925.

Gear Blanks Made Centrifugally

Process Described at Institute of Metals Meeting at Liege—Silicon-Aluminum and Other Alloys Discussed

(By Special Correspondence)

LONDON, ENGLAND, Sept. 11.—The making of bronze worm-gear blanks by the centrifugal process was discussed at the meeting of the Institute of Metals held at Liege, Belgium, at the beginning of this month. Another feature was the annual autumn lecture delivered by Dr. Walter Rosenhain, F. R. S., of the National Physical Laboratory, Teddington. The papers presented covered among other things alloys of copper and magnesium and of silicon and aluminum.

The centrifugal casting of gear blanks was described by F. W. Rowe, Huddersfield. A steel mold is used consisting of a flat bottom plate on which the top half rests and is held by cams. The top half has a central orifice down which the metal is poured. The centrifugal casting machine is arranged to spin the mold about its vertical axis. The driving mechanism is below floor level, and the bottom plate of the steel mold is bolted to a coupling on the vertical shaft, which is driven through a cone clutch and gearing by a variable-speed motor.

The hollow core which forms the interior of the blank is set in a print in the bottom half of the steel mold, the top placed on, and the cams rotated to lock it in position. The metal is poured into the central orifice in the mold and flows into the center of the core, from which it is flung out to the walls of the mold through suitable runners cut in the core.

A special refractory material is used for the cores, as with ordinary sand cores there is great danger of these bursting under the high pressures and mold speeds. The speed of rotation is designed to give a minimum pressure on the walls of the mold of 45 lb. per sq. in., and varies from 450 to 950 r.p.m. The molds are brought to a full speed before commencing pouring, which is done in the ordinary manner from plumbago crucibles suspended from a central runway.

A high casting temperature, varying from 1230 to 1320 deg. C., according to the size of the wheel, is used to secure a sufficiently long period of solidification to insure full automatic feeding of the metal by the centrifugal force. It is this automatic feeding "which constitutes one of the big advantages of the process over stationary die-casting." Actually, the molds are spun for 30 sec. to 4 min. after pouring, depending on the size of the wheel. The clutch is then thrown out, and the top half of the mold lifted off. The taper and design of the molds are arranged so that no difficulty is experienced in ejecting the spun castings by the special tackle employed. The molds are coated with a thin layer of refractory material mixed with carbonaceous matter to prevent sticking.

Five recent tests showed that an all-round improvement results from this mode of casting, although the density and hardness are not a great deal higher than those which obtain in a die-casting. Microscopic examination shows that the grain size is extremely small, but there is a small variation in structure and strength between wheel blanks of widely varying sections. At present, the smallest wheels being cast have a diameter of 6 in. and weigh 26 lb., while the largest have a diameter of 22 in. and weigh 195 lb. Over 4500 castings have been made, with an average weight of 85 lb., the total weight being over 170 tons and the value of the castings nearly £30,000.

Future of Metallurgical Development

Dr. Rosenhain in his lecture was emphatic that as our scientific knowledge of metals and alloys increases we find it necessary to pay more attention to an exact control of their composition and treatment. It is found desirable to use raw materials of the highest purity to secure that complete regularity and uniformity of products which cannot be obtained when natural impurities are permitted to occur in appreciable amounts. Dr. Rosenhain referred to copper and zinc, in regard to which modern requirements demand a degree of purity which could not be obtained by the older metallurgical methods. Consequently, he said, modern developments have resulted in a change of practice, which, to a large extent, is revolutionizing the industry by bringing about the increasing use of electrolytic refining.

Dr. Rosenhain referred incidentally to local concentration of knowledge and skill, often passing on from father to son, and he quoted an example to be found in America at the present time. In the Naugatuck Valley in Connecticut, a large brass industry has grown up. "There does not appear to be any particular reason why this industry should flourish there rather than in many other, perhaps more favorably situated places. It is due to the fact that a number of English brass workers emigrated to America and settled in that particular valley, and their descendants have carried on the industry on the basis of a kind of hereditary skill. The latter idea, however, has been dispelled by modern scientific methods, and, provided that those in control of the industry understand its principles thoroughly, it is by no means difficult to train new workmen to carry out the various operations in new localities."

Action of Hydrogen on Hot Solid Copper

Cyril S. Smith and Prof. C. R. Hayward (Massachusetts Institute of Technology) in one of the contributions to the meeting show that a sintering action occurs in copper when heated to high temperatures, resulting in the healing of cracks responsible for the brittleness of "gassed" copper. On account of this, copper heated in reducing atmospheres at high temperatures is stronger and more ductile than metal which has been gassed at about 800 deg. C., and a marked improvement in the properties of gassed copper occurs when it is annealed at elevated temperatures. Cast copper with less than 0.06 per cent of oxygen can be completely deoxidized in a comparatively short time by heating in hydrogen at a high temperature, but with higher oxygen content the rate of penetration of the reducing gas is less at high temperatures than at about 800 deg. C., where abnormal penetration occurs. This hitherto undiscovered fact is attributed to the closing up of fissures in the copper as the temperature rises. It is claimed that if gassed copper be subjected to a suitable thermal and mechanical treatment, the cracks responsible for the brittleness will disappear, and metal of good electrical and mechanical properties be obtained. This suggests a method of making a very pure deoxidized copper for special purposes.

Copper-Magnesium Alloys

W. T. Cook and W. R. D. Jones (Cardiff) gave an account of the preliminary experiments of a research on copper-magnesium alloys. Tensile tests show that the addition of small amounts of copper to magnesium in chill castings is beneficial up to 2 or 3 per cent. Brinell hardness tests show that on increasing the amount of copper in these alloys there is a corresponding increase in hardness. Commercially pure metal appears to harden on ageing but copper-magnesium alloys do not. The alloys used in the experiments have very low impact values when chill cast.

Commercial Aluminum-Silicon Alloys

Dr. A. G. C. Gwyer and H. W. L. Phillips (Warrington) dealt with the constitution, structure and mechanical properties of modified aluminum-silicon alloys. The alloys possess good founding qualities, are appreciably lighter than pure aluminum, and in both chill

and sand-cast states possess a high resistance to shock, excellent ductility and a high degree of incorrodibility.

J. D. Grogan (National Physical Laboratory) described the sodium and "salts" methods of modifying these alloys. The "salts" method is preferred because it gives more regular results. Mechanical properties of 1-in. diameter chill and sand-cast bars were given. Brinell hardness, proof stress and ultimate stress increase with increasing silicon within the range studied —8 to 14 per cent silicon—while elongation, Charpy impact value and density decrease. The presence of massive silicon is always accompanied by a marked decrease in elongation. There is little improvement in mechanical properties accompanying an increase in silicon content above 12 per cent. The results of some exploratory melts of ternary alloys containing zinc and magnesium were described. Zinc raises the tensile strength of the alloys, but seriously lowers the ductility; it also raises the density very rapidly. Magnesium ruins ductility without increase in tensile strength.

DESCRIBE INSPECTION METHODS

Comprehensive Data Given at A.S.M.E. Chicago Meeting—Other Papers Presented

Inspection methods were dealt with in a comprehensive paper by E. D. Hall, superintendent of inspection development, Western Electric Co., Chicago, presented at a session, held under the auspices of the machine shop practice division of the American Society of Mechanical Engineers, Sept. 23 at the Drake Hotel, Chicago. The meeting was held in conjunction with the eighth annual convention and exposition of the American Society for Steel Treating. F. W. Curtis, western editor of the *American Machinist*, was chairman.

Mr. Hall's paper outlined the fundamental principles and development of inspection work as a function of a manufacturing department. Some of the subjects included were standard specifications and tolerances; development of equipment and methods that will permit making precise tests and measurements rapidly; the design and use of automatic gaging devices; inspection work in connection with pace-setting equipment such as conveyors, and optical projection methods for inspecting contours and for amplifying measurements of small dimensions. The title of the paper was "Modern Developments in Inspection Methods."

In discussing optical methods, reference was made to apparatus for transforming light signals into sound signals and mechanical control. This is the photo-electric cell which is a highly evacuated vacuum tube having two electrical conductors inclosed, one of which is metallic sodium, potassium or calcium. When connected across a source of electric current it has the property of allowing more current to flow when a beam of light strikes it than when it is dark.

It may be used in connection with an amplifier similar to a radio amplifier, which magnifies the effect of the photo-electric cell so that it may be made to operate buzzers and relays, and through the relays, valves, motors or other controlling equipment. Apparatus shown by Mr. Hall by means of slides, consisted of a reflecting galvanometer used for making insulation resistance measurements, the photo-electric cell, amplifier, and associated apparatus. By attaching a photo-electric cell, a buzzer sounds whenever the allowed limit of deflection is exceeded.

These coils are used in sending pictures by wire in photometric work; for giving fire alarms from the presence of smoke, and for sorting objects having different shades of the same color, as in sorting cigars.

Machine gaging and testing of parts was discussed. It was said that considerable attention is being given to the problem of getting production on certain classes of inspection work. A number of plans of rating inspectors on their performance are being tried out. Some of these plans, it was said, give promise of increasing the output and at the same time improving the quality.

Design of Drop-Forge Hammer Anvils

American drop forging practice has advanced far beyond that of European, principally due to the demand of the automotive industry, said E. C. Clark, Chambersburg Engineering Co., Chambersburg, Pa., in his paper on "Drop-Forge Hammer Anvils," also presented at this session. Our greatest development, he stated, has been in the use of multi-impression dies.

The anvil of a steam drop hammer must absorb the blow of its high velocity ram, not only to get the maximum effect in the forging, but also to preserve the adjacent structures and equipment from shock and vibration. The hammer foundation is, in turn, a further shock absorber, and its construction also affects the life of the anvil. Since the anvil of a steam drop hammer represents from 40 to 60 per cent of the cost of the hammer, and the foundation cost is rarely less than 40 per cent of the cost of the hammer, and since both are the most inaccessible parts of the installation, it is imperative that their construction be studied thoroughly.

Essential considerations in designing a steam drop hammer anvil were discussed. The foundation under an anvil, it was pointed out, will greatly influence the life of the hammer and of the surrounding building structure and equipment. Since the anvil and its foundation cannot be made as a unit, and so avoid the shock and rebound at the instant of impact, it is imperative that a cushion be inserted between the anvil and the concrete. Oak or equivalent timbers are favored as a cushion. If a further cushion is desired, cork blocks seem preferable to felt. It was said that money and time expended in studying ground conditions and in installing proper foundations are well spent, and mean fewer breakages and interruptions.

"The Possibilities of Standardizing Design Details in Plants Manufacturing Special Machinery," by H. K. Keever, mechanical engineer, McDonald Machine Co., Chicago, was another paper at this meeting. Standardization not only of elemental parts but also of unit assemblies was advocated and the lowering of cost of manufacture by such standardization was stressed.

A fourth paper was on "Foremanship Training," by Hugo Diemer, director of industrial development, La Salle Extension Institute, Chicago. Foremanship training, like production control and personnel management, must be initiated, backed up and followed up by the top management, said Mr. Diemer. The value of foremanship training is in proportion to the extent to which the top management becomes interested and definitely cooperates. A chart showing the preparatory agencies leading up to systematic training in foremanship and subsequent group conferences, and studies growing out of such systematic training was included in the paper.

Few Immigrants in Metal Trades

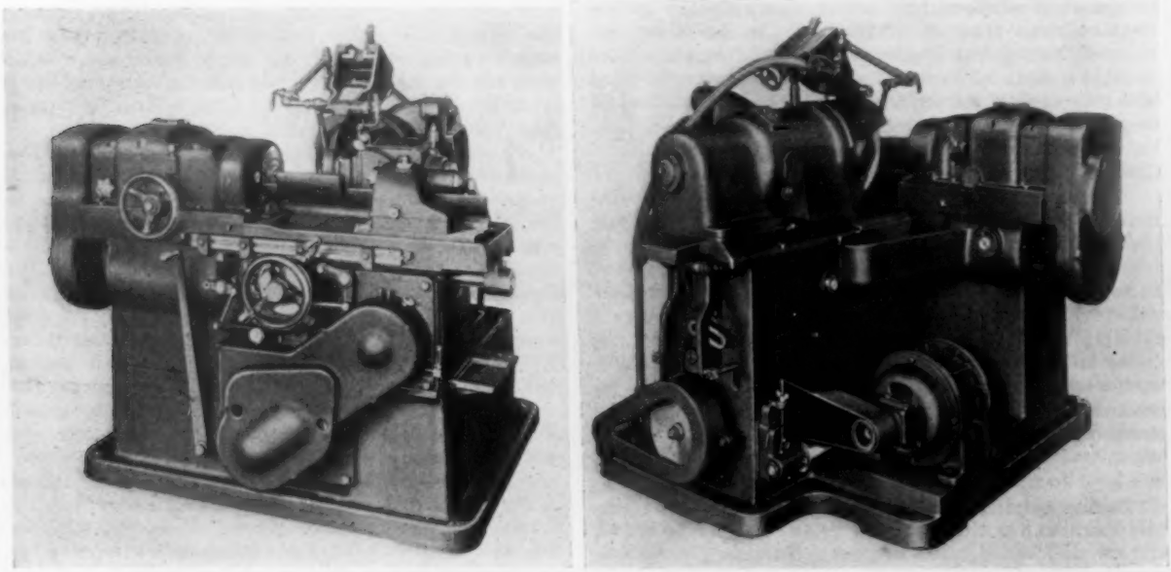
WASHINGTON, Sept. 28.—Of the 58,379 aliens entering the United States in the first month of the fiscal year beginning July 1, 1926, only 22,283 were classified as immigrants, according to the Bureau of Immigration. During the month 25,022 aliens left the United States, 17,970 of whom were returning visitors or aliens. Admissions of aliens during the last fiscal year were at the rate of 41,342 a month, and departures at the rate of 18,980 a month. Of the immigrants admitted during July Canada and Mexico, with 7239 and 5726, respectively, contributed more than one-half. During July 81 skilled iron and steel workers were admitted to the United States, while 20 departed. Metal workers admitted were 33, while four left the country, and in the case of machinists there were 99 admissions and 65 departures.

New Automatic Worm Grinder

A new development in machine tools for solving the difficult job of thread grinding on a production basis has been made by the Pratt & Whitney Co., Hartford, Conn. The machine will finish either single or multiple threads on one or both sides as desired. The only attention necessary is loading and unloading the work and dressing the grinding wheel. The worm grinder is a precision as well as a production machine, and can work to fine limits, still maintaining its speed.

Simple and sturdy as indicated in the illustrations, the machine bed supports a sliding table and a wheel slide that are at right angles to each other. The table carries a work driving head and a tailstock. Controls are all situated on the front of the bed and change gears provide for the necessary work speeds.

The new worm grinder is motor driven only. It requires a 5-hp. constant speed motor, 1150 r.p.m., either A.C. or D.C., for all thread depths up to 0.400 in. For thread depths of 0.400 to 9/16 in. a 7½-hp. motor is required. The motor is mounted on a pad on the bed of the machine, and is belt connected to the various movements. A friction clutch is provided in the machine for stopping and starting the work and the table movement.



This New Grinder of the Pratt & Whitney Co. Has Been Developed to Grind Hardened Worms Automatically on a Production Basis, Covering Those of Single or Multiple Threads and Those Requiring One or Both Sides to Be Finished

The wheel head is arranged so that the grinding wheel can be swiveled to 30 deg. to the right and 45 deg. to the left, to accommodate any thread angle, and graduations are provided for accurate setting. The drive to the wheel is through a pair of spiral bevel gears running in oil. These gears form the means by which the head may be rotated as previously mentioned. A belt inserted between these bevel gears and the grinding wheel serves to insure a smooth drive. The wheel is fed to depth by means of a four-pitch left-hand screw attached to a handwheel on the front of the bed. A power feed ratchet having 200 teeth is also attached to this screw and is operated by dogs on the table. One tooth of this ratchet wheel is equal to a feed of 0.00025 in.

The machine is arranged to grind in one direction only. At the end of each stroke, after the grinding wheel has passed through the thread, the wheel slide is automatically withdrawn and the table returns to its starting point, at which time the wheel moves in again to the proper grinding depth. This movement is continuous as long as the machine is in operation. The fact that the machine grinds on dead centers is mentioned as an additional advantage.

The table has a maximum travel of 7 in. and its movement is entirely controlled by a cam. This cam is specially cut to suit the lead of the work being done, and controls both the lead and the quick return of the table. This cam is hardened and ground for high accuracy and always rotates at constant speed in the same direction.

The work head is connected to the lead cam through suitable gearing, and is also tied in with the other movements of the machine to keep it from getting out of time. A simple and ingenious device takes care of the indexing of the work head for multiple threads. This indexing is accomplished by giving the gearing between the work head and the lead cam a fractional ratio, so that while the wheel is out of engagement with the work during the return stroke of the table, the work is automatically advanced through the fraction of a turn necessary to bring a new thread start in line with the wheel. An even ratio is necessary for single threads and a fractional ratio for multiple threads. Multiple threads may be ground with any number of starts, as long as the lead angle range is not exceeded.

A handwheel on the work head operates a differential gear which changes the relations between the lead of the work and the grinding wheel. This handwheel provides easy means of picking up the lead when setting up a piece of work, and may also be used to give a longitudinal feed to the work when only one side of the thread is being ground.

A truing device mounted above the wheel may be swung down when needed, but is, of course, out of the way during grinding.

Moving parts of the machine are inclosed by metal guards, and the machine is equipped with a water pump, tank and piping to deliver a continuous stream to the grinding wheel.

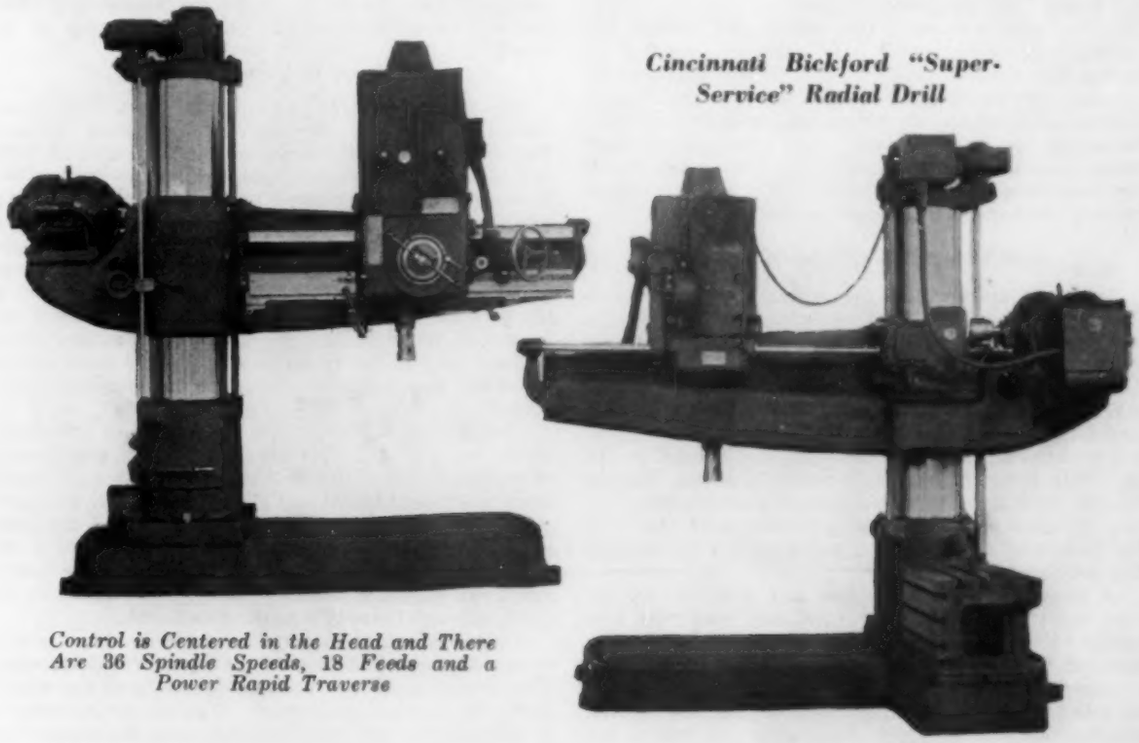
Crown Pipe & Foundry Co. to Increase Capacity

Contracts have been let for improvements on the plant of the Crown Pipe & Foundry Co., Jackson, Ohio, which will increase its capacity about 50 per cent, to 1500 tons per month. On Feb. 11 S. E. Stephenson, president Wellston Iron Furnace Co., Jackson, and I. P. Blanton, president Belfont Iron Works, Ironton, Ohio, were appointed receivers for the Crown company, and the plant has been operated continuously since March 1. Important among the projected improvements is an extensive heating system to permit the plant to be operated more efficiently during the winter months. George Bumgard is general foreman of the plant, and Dwight and Donald Jones are employed in executive capacities.

New Radial Has Distinctive Features

36 Speeds, 18 Feeds and Power Rapid Traverse Are Incorporated in the Head—Control Centralized, Oiling Is Automatic; Roller Bearings Employed

AMONG the new machines shown at the recent New Haven Machine Tool Exhibition, and at the more recent exposition held in Chicago in connection with the eighth annual convention of the American Society for Steel Treating, was the radial drill here illustrated. This machine, developed by the Cincinnati Bickford Tool Co., Cincinnati, and known as the Super-Service radial, marks an advance in radial drill design. The machine is available in 5-ft. and 6-ft. sizes.



Cincinnati Bickford "Super-Service" Radial Drill

Control is Centered in the Head and There Are 36 Spindle Speeds, 18 Feeds and a Power Rapid Traverse

The hole-to-hole cycle of radial drill operation consists of two main parts, the actual cutting time and the handling time. The latter is the interval from the instant the tool finishes one hole until it begins drilling the next.

To obtain a faster rate of cutting, and therefore reduce the time of the first part of the cycle, 36 spindle speeds and 18 feeds have been provided. This notably close gradation of speeds and feeds serves to allow working high-speed steel cutting tools that are much nearer to the limit of their capacity.

Control Highly Centralized

Reduction of the handling time, which is non-productive and generally exceeds the cutting time, permits of the largest savings in radial drill operation. It has been the object of the designers, therefore, to arrange the machine so that each movement required of the operator is performed through the shortest distance and with minimum effort. Centralization of control has been developed to a high degree. All speed changes are in the head, and the head is equipped with power rapid traverse. The arm is arranged to swing under slight pressure, and clamping, unclamping, raising and lowering of the arm is controlled by a single lever. The column is clamped by power at the head. These features, together with convenient location of control levers, make for unusually rapid handling.

In the direction of minimizing expense of repairs and depreciation, thorough attention has been given to lubrication. The new machine, it is stated, can operate over long periods without oiling. The entire head is oiled automatically. A submerged pump forces oil through a Purolator filter to the top of the head, from which the oil cascades down through all gears and bearings. The friction clutches run in oil. The roller bearing spindle is lubricated by means of a high-pressure grease system. Oil is supplied from a reservoir to the gibs and all surfaces of the head which bear on the arm. The arm raising and lowering unit, and the motor driving gears run in oil. The outer arm shaft bearing is packed in grease.

The entire driving mechanism from the motor to the spindle nose revolves in tapered roller bearings, which are sealed to prevent entrance of dirt. All shafts are splined with integral keys. Speed and feed changes are made through sliding gears, tumbler gears and spring dive keys having been eliminated.

Safety features, outlined in detail below, are also noteworthy.

All Speed Changes in the Head

The 36 selective sliding-gear speed changes in the head are obtained with only 17 gears, and only three levers are required for all these changes. The speeds have a 60 to 1 range with a maximum of 1415 r.p.m. The machine is furnished with any one of five initial speeds, which provide the following minimum and maximum spindle speeds: 15 and 912, 16 and 1004, 18 and 1124, 21 and 1278, 23 and 1415 r.p.m.

The 18 feed changes are obtained through selective sliding gears by the use of only two levers. The feeds range from 0.006 in. to 0.125 in. per revolution of the spindle. They also include tap leads for 8, 11½ and 14-thread pipe taps, which are pointed out as relieving the operator of the exertion required to start pipe taps and as eliminating the possibility of thin threads. A compensating depth gage provided permits not only of drilling to the predetermined depth, but also compensates for the length of the drill point.

The head is completely inclosed, includes power

rapid traverse, and although it contains the entire speed change mechanism, it is claimed to weigh less than the usual heads of radials of corresponding capacity. Power rapid traverse to the head is standard equipment. The constant-speed arm shaft has been utilized as a source of power, which is stressed as reducing the rapid traverse to a relatively simple mechanical device. Directional control positions the head quickly and without effort.

The spindle is provided with six multiple splines to assure minimum feeding resistance under heavy torsional loads. This arrangement is regarded as of extreme importance on heavy tapping in serving to eliminate the danger of thin threads. The spindle, spindle sleeve and feed rack pinion are of alloy steel, having an ultimate tensile strength of more than 200,000 lb. and twice the hardness of ordinary spindle steels. The feed rack is integral with the spindle sleeve. The spindle is counterbalanced at all positions by a flat coil spring and a patented cam arrangement compensates for the varying tension of the spring. The tension may be adjusted quickly to provide additional counterbalancing for heavy cutter heads, etc. A patented safety grip prevents the spindle from dropping should the counterbalance chain break. The entire counterbalance mechanism is inclosed in the head.

Arm Swings Under Slight Pressure

Although massive, the arm swings under the pressure of one finger. It is of patented triple box section construction, and the front and rear walls are tied together with heavy longitudinal ribs. All openings in the rear wall have been eliminated. The depth of the arm and the length of bearing on the column have been increased materially. A system of square lock gibs has replaced the dovetail mounting of the head on the arm, this being claimed to provide a better bearing and to maintain more accurate alinement after long use. It also prevents rocking tendency of the head due to lack of adjustment of the main gib or the cutting action of the tool.

A powerful, equalized screw and lever action, applied at both ends of the arm cylinder, binds the arm tightly to the column. Greater leverage is said to be provided for closing the upper end on account of the increased resistance at that point. A positive mechanical interlock prevents engagement of the raising and lowering mechanism while the arm is clamped to the column. Safety stops are provided to prevent movement beyond the upper and lower limits of travel.

The arm raising and lowering mechanism is built into the arm as a complete unit, fully inclosed and automatically oiled by flood lubrication. The screw is held stationary, the nut revolves. Friction clutches, incorporated in the unit, drive the nut in either direction without shock to any part of the mechanism. A patented safety nut sustains the arm and prevents it from dropping should failure occur in the threads of the main nut. The safety nut gives immediate warning of the failure, and the worn nut must be replaced before further raising or lowering of the arm is possible.

The column is larger and stronger than usual on radial drills of similar size, the column diameter being said to be 2 in. larger, the flange double the usual thickness, and the clamping surface having twice the contact area. The last feature is particularly emphasized by the makers in view of the fact that maximum column strength is possible only where the column sleeve and trunk are effectively tied together as one rigid unit. The construction of the lower part of the column, which permits of easy swinging of the arm, is of distinctive design, consisting of four large-diameter, hardened steel rollers mounted on roller bearings. These rollers are built into the sleeve above the clamping surface and roll on a hardened and ground steel ring on the trunk.

Column Is Power Clamped

Power clamping of the column is standard equipment, either air or electric clamping being optional. The operator may clamp and unclamp the column without leaving his operating position at the head, which is stressed as eliminating two round trips from the head to the column for every hole drilled. Air clamping is obtained through a double-acting air cylinder housed in the driving motor support; electric clamping is obtained through a torque motor mounted on top of the column. Both the air cylinder and the motor are located so that they are not exposed to dirt and chips, nor are they in the operator's way. The hand clamping lever does not move when power clamping is employed.

The base is of box section, and its entire area bears on the surface of the foundation. The top and bottom of the base are tied together by a system of heavy longitudinal and transverse ribs. These ribs, which are closely spaced, uniformly support the top of the base, so that jack screws or other auxiliary supporting devices are not required. The weight of the column, arm and head, together with the work, is transmitted directly through these ribs to the foundation.

Only one motor is required to drive the spindle, elevate the arm and operate the power rapid traverse. This motor is of the constant-speed type for either direct or alternating current. The motor support is of deep section and cast integral with the arm. The machine is completely wired. Wiring is run from the motor to the top of the column, down through the inside, and brought out through the rear of the base for connecting with an outlet in the floor. Piping for the air type column clamp is arranged in a similar manner. Both have revolving connections in the lower part of the column which allow the arm to swing in a complete circle. The machine can be furnished with a single-pulley belt drive if desired.

Multiple Drilling and Tapping Machines

The special drilling and tapping machine here illustrated was designed and built to drill and tap the five or six holes in a lock spindle of the ordinary door lock. The difficulty of the problem arises in part from the closeness of the holes.

The drilling unit as a whole consists of a special type, high-speed, all ball bearing sensitive driller with an automatic-feed mechanism, a 12-spindle adjustable auxiliary head and an automatically indexing jig.

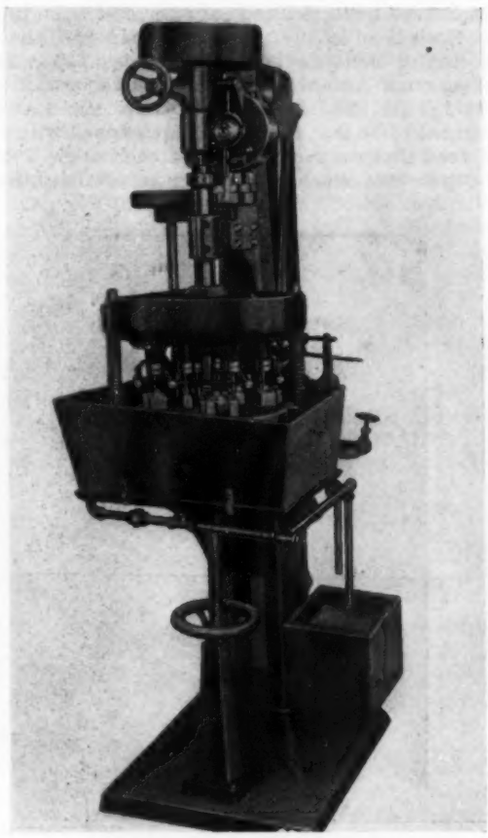
The sensitive driller was built by the Hoefer Mfg. Co., Freeport, Ill., and embodies base, table, elevating device, 12-spindle head, belt tightener, counter shaft, but in addition two supports have been added under the idler pulley carrier to give greater rigidity to counteract the greater pressure of the twelve drills in the auxiliary head. A belt guard is placed around the front pulley as an insurance against harm should the belt accidentally break. The quill support or bearing is cast solid with the head and provides a compact mounting for the feed mechanism, which, automatically and in time with the indexing of the jig, feeds downward and returns the auxliary head in a continuous cycle.

The feed mechanism is driven from the main pulley on the spindle through the hub extending downward through two annular ball bearings and sufficiently beyond to carry a hardened steel worm which is in mesh with a bronze worm gear. On the shaft, on which is located this worm gear, is a hardened clutch, by which the operator can start or stop the continuous cycles of feeding at any time. The lever is placed conveniently to the operator's position, as shown just below the main pulley on the right side of the machine.

The shaft that carries this worm gear and clutch extends straight back through bearings and carries another hardened worm, which meshes in the bronze worm gear seen on the upper end of the cam drum on the vertical shaft, just to the left of the main spindle. All these worms and worm gears are entirely enclosed in a housing, permitting continuous lubrication. The cam is of the ordinary built up section type and is made with the rapid approach, feed, quick return and then dwell. During these different segments, the various functions of drilling, indexing, etc., are being per-

formed in time with the above. The cycle of the cam, in this particular case, is 12 sec., so that it is seen that ample time is allowed for various operations but still a high rate of production is maintained. The ratio between the main pulley and the cam is 240 to 1.

The auxiliary head is a 12-spindle head in which the spindles are grouped four in each group, as the



This Machine Was Built for Drilling and Tapping Holes in a Lock Spindle

centers are so close that only two holes are drilled in two lock spindles in each of the three drilling positions; but six holes are drilled in each of two spindles at each indexing. The fourth position is used for loading. The head was made adjustable to accommodate different lengths of lock spindles, thus permitting one machine to take care of a great variety of work.

In order to maintain the alinement of the head and jig, these two units are tied together by means of heavy guide rods on which springs were placed which act as a cushion and counterbalance for the head.

Coming to the automatically indexing jig, a number of interesting features are embodied. Because of the splash pans, the details of construction cannot be readily seen and this description must be depended upon to give these details.

The jig consists of a hollow base in which is located the gears and the Geneva movement for the indexing, a cover for this and a rotating table. Underneath the table there is carried on the base plate four generous upright supports, which are scraped and form a bearing for the thrust of the table.

The indexing movement consists of the train of gears which are on the upper end of the vertical shaft rising from the left hand side of the table and connects to the cam drum from which it secures its timing.

On the lower end of this shaft is another train of gears driving a Geneva movement. All the gears and Geneva movement are fully encased. With this automatic indexing timed to the best advantage when speed and feed of drills are considered, and also from the ability of the operator to load and unload his fixture, it is readily seen that maximum possible production is secured. The indexing table carries four fixtures of two each, so that when the table is full eight lock spindles are provided for. These fixtures are of steel, hardened, and have a fixed end so that all holes are properly located from one end. The center lines of the two adjacent lock spindles in one fixture are 1¾ in. so as to permit of ample gear centers in the head. Of the four fixtures one is always in the leading position. When in this position a cam beneath the table is in contact with the clamping mechanism for the lock spindles, so that in no way is the operator concerned with locking or unlocking of his pieces in the jig. Just as soon as the table begins its motion to the next station, the clamping bars for the lock spindles ride off the cam and by means of springs hold the spindles firmly in their jig while completing the cycle during which the 12 holes are drilled complete on two spindles.

A guide bushing plate having guide bushings for each drill is carried on the head. There are also provided V-blocks which raise and lower with the head, and these assure the proper location of the lock spindles so that all holes are drilled in a straight line.

The speed of the machine was 1200 r.p.m., with an increase in the head in order to run the drills at 2000. Only 0.004 in. feed was used on the drills, but even with this the production was at the rate of 600 pieces per hour with one operator.

Loading Device for Foundry Mixers

An air-operated device known as the Simplex loader, for use in connection with mixers, has been placed on the market by Scully-Jones & Co., 2012 West Thirteenth Street, Chicago.

The arrangement of the loader may be noted from the illustration. Operation is controlled by two chains on the air hoist of the device. After the mixer has been filled the hopper of the loader is lowered to the floor level, and while the batch is being milled, the

The Hopper Reloads the Mixer from the Upper Position, as Shown

operator fills the hopper with the proper ingredients. When the batch is properly mixed, the mill is emptied and again reloaded by the loading device as shown.

The Domhoff & Joyce Co., Cincinnati, pig iron and coke dealer, has been appointed exclusive selling agent for Rock Run warm blast charcoal iron, produced by the Rock Run Iron Co., Rock Run, Ala. Heretofore the former company restricted its activities to the territory west of and including Pittsburgh.

For Drilling Holes in Boiler Plate

To meet the demand of the railroad shops for heavier equipment required in the building of the modern larger type locomotive, the Foote-Burt Co., Cleveland, has designed a drilling machine, which it calls the No. 3 mud ring and flue sheet drilling machine, regularly equipped with four No. 30 heads. The machine is built to drill the rivet holes around the fire box mud rings, and the flue holes in boiler flue sheets. The long travel of the table, the back and forth adjustment of the spindles, as well as the in and out adjustment of the spindles, allows the drilling of large flue sheets in one setting.

The spindles overhang the finished edge of the base, so that mud rings can be bolted to this finished edge by means of three T slots running horizontally for drilling the rivet holes. The two further outside knees that support the table are fixed, but the three center knees are adjustable back and forth in case they interfere with the clamping of mud rings. Of course, when drilling flue sheets all knees are securely doweled in position to form the bearing for the table.

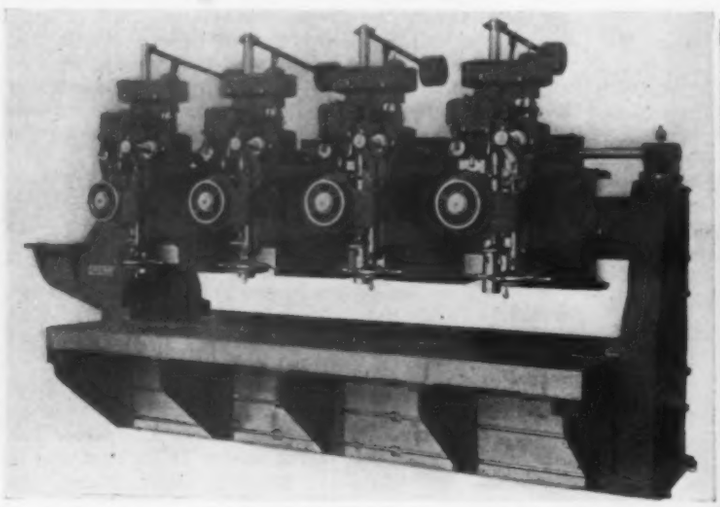
This machine is arranged so that a pit can be placed in the floor flush with the front finished edge of the base to allow the mud rings to project down in them for drilling the rivet holes. The size of the pit is naturally governed by the size of the mud rings.

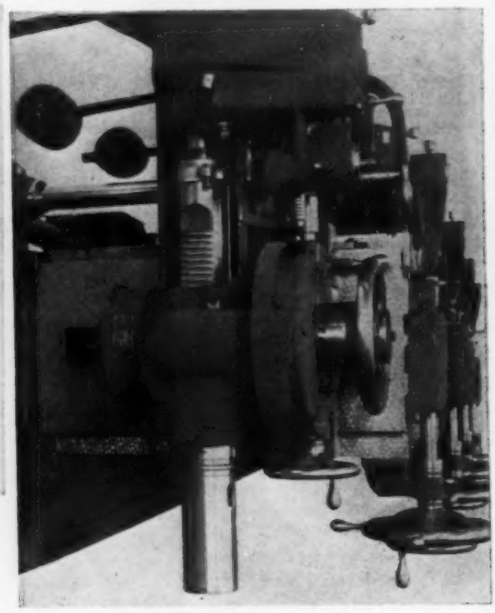
This machine can be arranged for either belt or motor drive as desired. The power is transmitted through a heavy horizontal shaft where the drive is taken for each head through bevel gears. Power is transmitted through a vertical shaft in each head through spur gears direct to the spindle.

Each head has a drilling capacity of 3½ in. in solid steel. Each head is adjustable along the rail, the minimum center distance between spindles being 24 in. The maximum distance between the two outside spindles is 123 in. The spindles also have an in and out adjustment of 18 in. Each head is equipped with three quick feed changes independent of each other.

To make the machine as rigid as possible, the uprights are bolted to the base in an L-shaped pad. The crossrail carrying the heads is a box type and is placed in large slots in each of the uprights and bolted from three directions. Each head slide is wrapped completely around this box type crossrail and gibbed to obtain the maximum bearing on the crossrail.

The table has a working surface of 75 x 144 in. and provided with in and out adjustment of 60 in., and should be placed at the extreme rear position when drilling mud rings.

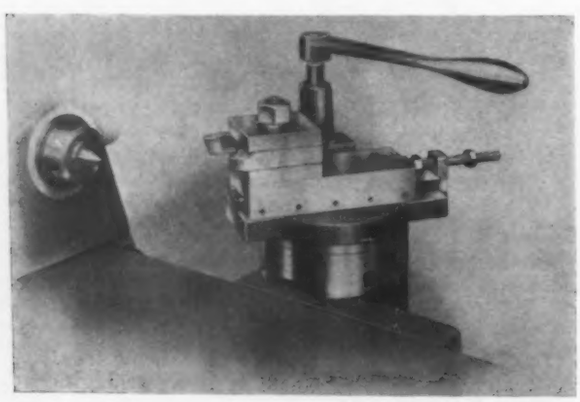




The No. 3 Drilling Machine Has Four Spindles, on 24-In. Centers, Each Rated for 3½ In. in Solid Steel. They have an in-and-out adjustment of 18 In.

Angular Facing Attachment for Lathe

The Porter-Cable Machine Co., Syracuse, is placing on the market the angular facing attachment here shown, which has been designed for use on its Hi-Speed production lathes.



The Lathe Attachment Is Moveable on the Tailstock Ways. The swivel feature permits tools to be turned at any angle

Mounted on the tailstock ways, this device may be moved to any position on the bed of the lathe, while the swivel feature permits of turning the tool at any angle to the work, and fed in by hand at the desired speed. An adjustable stop is provided to regulate the depth of cut. The position of the attachment on the ways and the angle of the cutters are maintained by clamping screws provided. An open-type tool holder mounted on the carriage slides forward and backward on dovetailed ways by the action of a rack and pinion connected with the handle. This is in turn mounted on a swivel plate. The supporting member is a strongly-ribbed casting.

In addition to its use for angular work such as facing gear blanks, the attachment may be employed for chamfering and necking work before or after turning. In this it is claimed to have the advantage of allowing just the desired amount of pressure against the parts on the arbor.

The National Association of Farm Equipment Manufacturers will hold its thirty-third annual convention, Oct. 20 to 22 inclusive, at the Palmer House, Chicago.

Self-Contained Dryer for Small Metal Parts

A centrifugal dryer equipped with direct drive and electric heat and intended for use in removing moisture from small metal parts after they have been washed is shown in the accompanying illustration. The drying of pieces which have been dipped, plated or japanned, and of wipe rags and waste after washing are among other uses for the machine, which is known as the Curtis Cyclone dryer and is being marketed by the Leon J. Barrett Co., Worcester.

Two sizes, designated as the No. 250D and No. 500D, with capacity of 1440 cu. in. and 3824 cu. in., respectively, are available. The driving motor, of special design for this application, is mounted on the spindle under the pan, as shown. A 1½-hp. motor is employed in the smaller machine, and a 3-hp. motor in the larger dryer. The entire rotating unit of the machine, comprising pan, spindle and motor assembly, rests upon a single ball and socket bearing at the bottom, the socket being secured to the housing. Vibration is said to be largely eliminated in this design, being focused directly to the pivotal bearing in the base. For the purpose of equalizing unbalanced loads, flexible mounting by means of steel springs is provided for the rotating unit. The spindle is equipped with roller bearings, which are lubricated from grease cups.

The machine is arranged so that warm dry air, or air at room temperature, if the heat is disconnected, is forced through the contents of the work container. Operation of the dryer is controlled by a single lever on a drum-type controller, and the arrangement is such that the electric current is cut off automatically when the machine is stopped. The forward position of the lever for starting locks in place for running; the reverse, for braking, is spring actuated to prevent running in reverse unintentionally. It is stated that the machine may be accelerated to speed under load in 10 sec. and stopped in 12 sec.

Metal parts to be dried are placed in the perforated container shown, which may be lifted on and off the spindle by means of the lever-operated hoist at the side of the machine. The container cover, a flat steel disk, is provided with oblique slots edged with fins which serve as fan blades. This cover is secured by the spindle nut which holds it in place. It is equipped with an automatic safety lock which prevents accidents from starting the machine when the cover is raised. Over the top of the machine at the center of the hinged lid is the electrically-heated radiating grid for drying the air. A strong current of air, passing down into the center and up the sides, is developed by the centrifugal force of the rotating container. Vacuum at the center is prevented by the openings in the container cover.

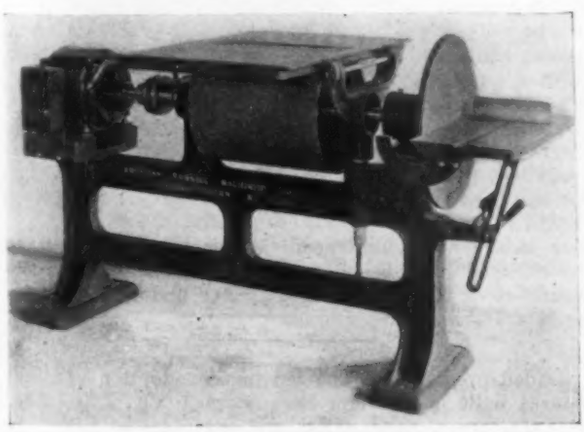
The container is filled two-thirds full of parts or material to be dried, which are roughly leveled. The disk cover is then secured in place by the spindle nut.

The Machine Forces a Strong Current of Electrically Heated Air Over the Metal Parts to Be Dried

The revolving action of the machine tends to move the loose parts toward the rim of the container, forming a hollow cone at the center. This permits dry air to be forced to the bottom of the pan before its course is reverted. Thus, it is pointed out, the drying air permeates the contents of the container.

Motor-Driven Drum and Disk Sander

A drum and disk sander arranged with direct-connected motor drive, as shown in the accompanying illustration, has been added to the line of the American Saw Mill Machinery Co., Hackettstown, Pa. The machine is designated as the No. 932, and is adapted for the sanding of flat or bent work on the drum, and for general disk sanding.



The Drum Table Is Adjustable and May Be Removed for Sanding Curves. The disk table is also adjustable and is fitted with a miter fence for sanding irregular work

The drum is 13 in. in diameter and has a 16-in. face. It is provided with a groove and clamping strip to hold and stretch the sandpaper and carpet, one end of the carpet being fastened to the drum and the other end clamped with the paper. The drum table measures 21 x 32 in. It may be adjusted by means of screws to the position suitable for flat sanding, and may be removed conveniently to permit of sanding curves. The disk is 18 in. in diameter and the disk table measures 10 x 25 in. This table is arranged for adjustment to any angle up to 45 deg. in either direction and is provided with a groove and miter fence for the sanding of irregular work.

The main frame of the machine is cast in one piece and is of heavy design to minimize vibration. The arbor on which the drum and disk are mounted runs in ball bearings. A 2-hp. 1000-r.p.m. motor is employed. The floor space occupied by the motor-driven unit is 32 x 65 in. The shipping weight, with motor, is 830 lb.

Unfilled orders Sept. 1 on the books of the Allis-Chalmers Mfg. Co., Milwaukee, amounted to $13,056,000, an increase of $56,000 over the Aug. 1 total and nearly $3,500,000 over the end of January bookings. The previous peak was $14,000,000 in February, 1921.

Extends Range of Use in New Vertical Shaper

The Pratt & Whitney Co., Hartford, Conn., has placed a new 12-in. vertical shaper on the market. It has been making vertical shapers in two sizes for a number of years, and the new model was developed to take the place of the old 10-in. model and greatly extend its range.

Operating convenience and the wider range of speeds and feeds are the outstanding features. The three operating handwheels are all located right on the front of the machine. The feed reverse lever and the friction

The Three Operating Handwheels Are All at Front of the New Pratt & Whitney Shaper, with Operating Levers at Convenient Reach

clutch lever are also within easy reach of the operator, so that he has complete control of the machine without moving from the front of it.

The basic principle of the vertical design remains unchanged. As shown in the illustration, the shaper consists of a solid bed which mounts a rotary work table and a column which supports the vertical ram and contains the ram actuating mechanism. This type of construction is to bring all cutting pressures directly on the table and the solid bed beneath.

The new model is designed for either a built-in motor drive or a single pulley belt drive from a line-shaft. The main drive pulley of the machine rotates at a constant speed of 440 r.p.m. When arranged for individual motor drive, a 5-hp. constant speed motor is mounted inside the bed. The floor space required for both the motor and belt-driven machines is therefore the same. The position of the motor is low to eliminate vibration. Space is provided on the column for whatever electrical control equipment is desired.

The friction clutch lever has three positions, namely, a working position, a neutral position, and a third position which applies a brake for stopping the ram quickly. The gear box is on the right side of the column. Four speeds and a neutral position are provided and an H shift lever forms a convenient means of control, comparable to the type of transmission used in automobiles.

The ram slide and ram form a separate unit on the front of the column. The slide is heavily hinged at the top and has a heavy screw adjustment at the bottom so the entire unit may be swung to any angle desired up to 5 deg. and locked in position. This construction permits the machining of the angular sides of dies. An angular scale is provided. The length of stroke of the ram is variable from zero to 12 in. by a lock nut adjustment on the end of the feed cam. The four speeds obtained from the gear box produce ram speeds of 22, 37, 56 and 90 strokes per minute.

The tool head is of a new design. The tool post is carried in a clapper which has the same action as in a horizontal shaper or planer. The tool is held by drawing the tool post against it from the back.

The feed gear box is located at the right of the bed directly below the table. A notched wheel and double pawl take the rocker motion delivered by the connecting rod to the notched wheel shaft and change it to an intermittent rotary motion. The feed gear box provides a forward, neutral and reverse feed drive by means of a bevel gear mechanism, and is controlled by a knob on the front of the bed convenient to the hand of the operator. Machining can be done in either direction simply by operating the knob control.

Longitudinal ways on the carriage mount the circular table. A total transverse travel of 25 in. and a longitudinal travel of-25 in. are available. Handwheels and micrometer dials for hand traversing in either direction are provided and binders are furnished for locking both slides in position when desired. The 24-in. rotary table is provided with four indexing notches so that quick indexing may be had for surfaces to be machined at angles to each other. The rotary power feed allows circular surfaces and holes to be machined. The range of feeds available is 0.0021 to 0.0833 for the transverse and longitudinal travels, and 0.0043 to 0.1745 on a 10-in. radius for the rotary power feed. The distance from the table top of the under side of the ram bearing is 14 in. and the maximum distance between the table and the ram itself is 24½ in. The tool post takes a tool ⅞ x 1⅝ in. The floor space occupied by the shaper, with either belt or motor drive, is 5 ft. x 7 ft. 2 in., and the overall height is 8 ft. 5 in. The machine with regular equipment weighs about 7500 lb.

Block and Clamp for Bench and Machine Work

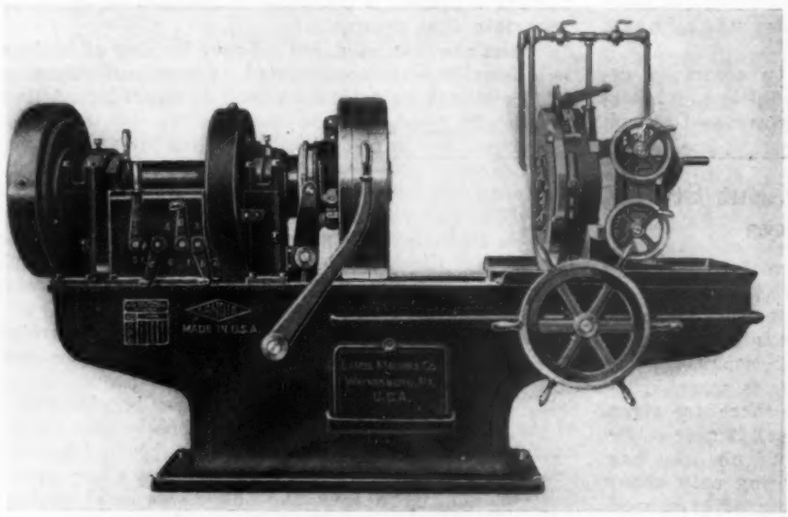
The accompanying cut shows a new small tool brought out by the Brown & Sharpe Mfg. Co., Providence. It is a V-block and clamp, designated as No. 751, and designed to serve for such uses as holding small circular or flat pieces while being milled, ground or drilled. Similarly it can be used for straightening rounds or flat pieces and for holding for various hand or machine operations pieces too small to be clamped in a bench vise. It will ordinarily take round stock up to 1 in. in diameter and flat stock up to ¾ x 1¼ in.

Good progress is reported in the adoption of steel houses built by William Beardmore & Co., Ltd., steel manufacturers, shipbuilders and engineers of Glasgow, Scotland. The Scotsman's prejudice is encountered in favor of stone houses, which, of course, have been regarded as necessary to withstand severe water conditions.

Builds 4-In. Pipe Threading and Cutting-Off Machine

The Landis Machine Co., Waynesboro, Pa., has added to its new line of pipe-threading and cutting-off machines a 4-in. size. It has a base of different design from the other sizes, to provide ample support for the headstock and carriage. And it has a gear box and a single pulley drive, readily convertible to motor drive. A reversing mechanism, contained in the gear box, is operated by a lever located conveniently for the operator. This, of course, eliminates the necessity of throwing a switch when the machine is to be reversed.

The front and rear chucks are of the three-jaw type. The front chuck has universal adjustment. It is also lever operated, permitting pipe to be put in and taken out of the machine without stopping and thus facilitating production. The rear chuck has independent adjustment. The main spindle of the machine is supported by two distinct bearings which are lubricated by flat link chains running in an oil reservoir.



This Landis Threading and Cutting-Off Machine Covers a Range of 1 to 4-in. Pipe

The carriage supports the cross rail, on which is located the die heads, the centering jaws, the cutting-off tools and the reaming tool. Two cutting-off tools are employed and are located diametrically opposite each other in holders which have a universal movement to and from the center. These holders also have a horizontal adjustment for centering the tools. The reaming device is attached to the cutting-off tool slide and is lever operated.

The range of the machine is 1 to 4 in. This range is covered by two Landis stationary pipe die heads, namely, a 2-in. head for a range of 1 to 2 in. and a 4-in. head for a range of 2½ to 4 in. The die heads float horizontally in a T-slide on the cross rail. The cutting solution system includes a rotary pump, a by-pass for the surplus solution and also control valves at the die head and cutting-off tools.

Starting, stopping and reversing levers are located on the operating side of the machine within convenient reach of the operator. The levers for obtaining the various speeds within the range of the machine are also located on the operating side of the machine. The machine has eight speeds. The travel of carriage is 24 in. The floor space required is 4 ft. 5¼ in. by 8 ft. 6 1/16 in.

The number of electric hoists ordered during August decreased 6.8 per cent as compared with the previous month, and the value of the orders decreased 3.5 per cent as compared with July. Shipments were 15.5 per cent larger in August than they were in July. The statistics were collected by the Electric Hoist Manufacturers' Association, E. Donald Tolles, 165 Broadway, New York, secretary-treasurer.

Speed Lathe for Reaming, Polishing, Lapping and Other Operations

For burring, reaming, counter-sinking, filing, polishing and lapping small parts the Cincinnati Electrical Tool Co., Cincinnati, has added a motor-driven speed lathe to its line of electrical drills, grinders and buffers. The machine, though of broad applicability, is of particular value to the automobile manufacturer.

The standard speed of the machine is 900 r.p.m., but speeds from 90 to 3400 r.p.m. can be furnished. A speed of 90 r.p.m. is recommended for such work as reaming piston pin holes, burring hinge rods and fitting piston pins to connecting rods. One of 300 r.p.m. is the speed used for finish-reaming babbitt bearings, while a speed of 900 r.p.m. is recommended for such operations as reaming babbitt from bolt holes, removing excess tin from connecting rods, and burring and chamfering bolt holes.

Speed Lathe for Burring, Reaming, Filing, Countersinking, Polishing, and Lapping Operations

The ½-hp. speed lathe here shown is supplied as illustrated, with No. 2 Morse taper socket, the motor wound for alternating current or direct current. The weight is approximately 135 lb. A table provided with micrometer screw adjustment can be furnished, and the machine can also be fitted with a multiple spindle head.

The Ingersoll-Rand Co., 11 Broadway, New York, in an attractively printed booklet deals with the evolution of railroad motive power from its introduction a century ago to the advent of the oil-electric locomotive. A series of drawings illustrates various stages of railroad development and leads up to the performance of a 100-ton oil-electric locomotive now in service on the Long Island Railroad. Starting at Erie, Pa., with a loaded freight train, a run of 537 miles was made to New York without change of locomotive or addition of fuel or water. The total cost of both fuel and lubricating oil was $26.15, or an average of less than five cents a mile.

Phelan McShane, general engineer Westinghouse Electric & Mfg. Co., emphasized motors and their care in a talk given before the members of the Pittsburgh Foundrymen's Association at the Fort Pitt Hotel, Monday evening, Sept. 20. His subject was "Use of Electricity in the Foundry." The speaker did not touch upon electrical melting.

Continental Mills Heavily Booked

Quoting Long Deliveries—British Still Large Buyers—Possible Compromise on Belgian Quota in International Cartel

(*By Cable*)

LONDON, ENGLAND, Sept. 27.

THE pig iron situation is critical, with Cleveland producers sold out until the end of October and stocks exhausted. Prices have been advanced 5s. more and at best are nominal. November is now talked of as the earliest possible time more furnaces can be blown in. Hematite is firmer and supplies of East Coast mixed are scarce.

Finished steel is strong and some plate mills are sold out for three months. Production continues at a low ebb as big mills are unable to use foreign fuel. The sheet mills and makers of light material are operating at about 50 per cent of capacity, using foreign semi-finished material and fuel.

Continental markets are strong on continued demand from British consumers of semi-finished and merchant material. Some Belgian works are sold out on sheet bars to the end of the year. Sheet bars have sold at £5 8s. to £5 10s. per ton, f.o.b., and mills are now asking eight to ten weeks' delivery. The Wire Rod Syndicate has advanced rods to £5 15s. per ton, f.o.b.

Formation of a continental raw steel cartel is still indefinite because of Belgian opposition, but as the opposing mills are inclined to modify their demands agreement is believed possible by Oct. 1. The German Raw Steel Syndicate has authorized continuation of the 70 per cent output in October. German interests are considering formation of a rolling stock cartel.

Tin plate is slightly firmer for after strike shipment, but the situation is generally unchanged owing to the uncertain coal prospects.

Sales are restricted, but a heavy backlog of business is believed to have accumulated. Galvanized sheets are firm, although sales are confined to small lots. Black sheets are quiet.

British Iron Output Low But Steel Production Improves

LONDON, ENGLAND, Sept. 16.—The coal strike drags on, and while at one time hopes were entertained of an early settlement, latterly these have been dispelled and no one can say when the normal mining of coal in this country will be resumed. In the meantime, the iron and steel situation steadily becomes worse, particularly in the pig iron market, but there are signs of a rapid revival when the coal deadlock is over. For all practical purposes the production of pig iron has ceased to count, the August output being only about 13,000 tons, with six furnaces active Aug. 31, compared with 147 at the end of April immediately prior to the commencement of the strike.

The production of steel, however, is increasing, due largely to increasing imports of foreign fuel and semi-finished steel, and the output of ingots and castings in August was advanced to about 52,000 tons, an increase of 20,000 tons. Meanwhile there is no Cleveland foundry iron in stock and most of the current make as well as next month's production has been sold already. Values in consequence are exceedingly firm and Cleveland iron has been advanced again, No. 3 G.M.B. now standing at £4 12s. 6d., f.o.t., for domestic use, and at £4 13s., f.o.b., for foreign consumption. Hematite also is firm, but the supplies at present available are sufficient to satisfy the current demand, so that the value has not risen in proportion to that of Cleveland.

The output of steel is increasing, aided by foreign coal and foreign bars, blooms and billets. The galvanized sheet makers are operating at about 70 per cent, but the production is not altogether regular owing to the difficulties experienced from time to time in the handling and use of foreign fuel. Makers of heavier products have been booking orders for after strike delivery and when they are able to resume nominal rolling again, some will be kept fully employed for several months.

Ocean Freights to Japan Reduced on Continental Pig Iron

TOKIO, JAPAN, Sept. 1.—Considerable adverse criticism is being directed by steel men at the Pig Iron Joint Sales Guild, which has recently purchased 10,000 tons of pig iron in the open market with the object of

British and Continental European prices per gross ton, except where otherwise stated, f.o.b. makers' works, with American equivalent figured at $4.86 per £ as follows:

Durham coke, f.o.b..	£2	7½s.				$11.54	
Bilbao Rubio ore†..	0	19¾	to £1	0s.		4.80 to	$4.86
Cleveland No. 1 fdy.	5	0				24.30	
Cleveland No. 3 fdy.	4	17½				23.69	
Cleveland No. 4 fdy.	4	16½				23.45	
Cleveland No. 4 forge	4	16				23.33	
Cleveland basic (nom.)	3	15	and 3	15½		18.23 and	18.35
East Coast mixed...	4	4				20.41	
East Coast hematite.	4	5				20.65	
Rails, 60 lb. and up	7	0	to 8	0		34.02 to	38.88
Billets	6	10	to 8	0		31.59 to	38.88
Ferromanganese ...	14	0				68.04	
*Ferromanganese ..	14	0				68.04	
Sheet and tin plate bars, Welsh	6	5				30.37	
Tin plates, base box	1	0½	to 1	3		4.95 to	5.59
Black sheets, Japanese specifications	15	5	to 15	10		74.12 to	75.33
						C. per Lb.	
Ship plates	7	10	to 8	0		1.62 to	1.73
Boiler plates	9	15	to 11	0		2.11 to	2.39
Tees	7	15	to 8	5		1.68 to	1.78
Channels	7	0	to 7	10		1.41 to	1.62
Beams	6	15	to 7	5		1.46 to	1.57
Round bars, ¾ to 3 in.	8	0	to 8	10		1.73 to	1.84
Steel hoops	10	10	and 11	0*		2.28 and	2.39*
Black sheets, 24 gage	11	5	to 11	10		2.44 to	2.49
Galv. sheets, 24 gage	16	10	to 16	15		3.58 to	3.63
Cold rolled steel strip, 20 gage, nom.	18	0				3.91	

*Export price.
†Ex-ship, Tees, nominal.

Continental Prices, All F.O.B. Channel Ports

(Per Metric Ton)

Foundry pig iron: (a)						
Belgium	£3	13½s.	to £3	15s.	$17.86 to	$18.22
France	3	13½	to 3	15	17.86 to	18.22
Luxemburg	3	13½	to 3	15	17.86 to	18.22
Basic pig iron:						
Belgium	3	6	to 3	9	16.04 to	16.78
France	3	6	to 3	9	16.04 to	16.78
Luxemburg	3	6	to 3	9	16.04 to	16.78
Coke	0	18			4.37	
Billets:						
Belgium	5	0	to 5	5	24.30 to	25.52
France	5	0	to 5	5	24.30 to	25.52
Merchant bars:					C. per Lb.	
Belgium	5	6	to 5	10	1.16 to	1.21
Luxemburg	5	6	to 5	10	1.16 to	1.21
France	5	6	to 5	10	1.16 to	1.21
Joists (beams):						
Belgium	5	4	to 5	12½	1.14 to	1.24
Luxemburg	5	4	to 5	12½	1.14 to	1.24
France	5	4	to 5	12½	1.14 to	1.24
Angles:						
Belgium	5	10			1.21	
⅛-in. plates:						
Belgium	6	10	to 6	15	1.43 to	1.49
Germany	6	10	to 6	15	1.43 to	1.49
⅞-in. ship plates:						
Belgium	5	18½	to 6	7½	1.30 to	1.40
Luxemburg	5	18½	to 6	7½	1.30 to	1.40
Sheets, heavy:						
Belgium	6	3	to 6	4	1.33 to	1.34
Germany	6	3	to 6	4	1.33 to	1.34

(a) Nominal.

making the pig iron price firmer. The current price of No. 1 foundry is now 48.50 yen per ton.

The total production of pig iron in Japan during 1925 was 600,000 tons, and there was from 200,000 to 250,000 tons imported. Recently the China Outward Freight Conference of steamship companies reduced the freight rate on European iron to Japan from 35 shillings, the former charge, to 30 shillings per ton.

Stocks of pig iron in Japan were smaller at the end of the first half of this year. At the end of June there was a total of 156,407 tons held by producers, dealers and consumers, a decline of 12,525 tons from May. Of this tonnage, 61,428 tons was in the hands of producers, 26,189 tons held by dealers and 68,970 tons on the yards of steel plants and other consumers.

BELGIAN MILLS FILLED

Quoting Deliveries Extending to Six Months—Price Advance Continues

ANTWERP, BELGIUM, Sept. 18.—Firmness continues and advances in prices are still being made despite the small tonnage of business being placed. Available stocks, however, are small and most of the important producers are unable to quote any but extended delivery. The position of the mills is rather unsatisfactory, for despite the higher prices being obtained for their output, increased costs of raw materials, wages and freight rates are maintaining the margin of profit at a low level.

The British coal strike is still bringing a considerable volume of business to the Continental mills, but it is becoming more difficult to secure these orders, as prompt shipment is always specified and most producers have but little immediate tonnage available. With many consumers of steel convinced that the proposed International Steel Syndicate will be established when the present difficulties are settled, demand is increasing for all products that might be included in such an association. On the other hand, there is a belief in some quarters that the Belgian demand for a quota of 290,000 tons instead of the 265,000 tons decided upon by the international conference, may prove a stumbling block, which will cause considerable delay.

Pig Iron.—Buying has decreased, but the quantity available for current delivery is still small. Furnaces are not yet interested in sales for October delivery and prices continue largely unchanged. No. 3 phosphoric foundry iron has been advanced and is quoted at £3 12s. to £3 13s. per metric ton ($17.85), f.o.b. Antwerp. British users continue to take some tonnage at the new prices.

Semi-Finished Material.—It is becoming exceedingly difficult to place business with mills for any but long term deliveries. Production is reported at maximum and there is still a large unsatisfied demand for early shipment material. Seeking to secure early shipment, buyers have advanced the market by offering higher and higher prices. As long as the British coal strike continues no change in the situation is expected. Recent sales have established as high as £4 18s. ($24) per metric ton for 2-in. to 4-in. billets and as high as £4 10s. has been quoted on blooms, f.o.b. Antwerp.

Finished Material.—Prices continue to advance, although buyers are not particularly active. Foreign purchasers, especially, are inclined to delay purchase in view of the recent advances. Costs are higher and makers point to the further increase of 25 per cent in railroad freights, which will become effective Oct. 1, in explanation of the present quotation on bars of £5 2s. ($25) per ton, f.o.b. Antwerp. Some makers in the Charleroi district have advanced quotations on bars to £5 3s. and as high as £5 5s. ($25.75) per ton is being quoted, with deliveries at four to six months. Luxemburg makers are asking up to £5 6s. on bars. Beams are scarce, with normal specifications bringing up to £5 2s. and £5 3s. per metric ton. Hoops and bands are firm, but not advancing. Reinforcing bars are bringing £5 15s. ($28.20) per metric ton, f.o.b. Antwerp.

GERMAN COTTON TIES ACTIVE

Exports Go to India, Africa and South America —Austria and Czechoslovakia Also Compete

HAMBURG, GERMANY, Sept. 11.—In recent months German manufacturers of cotton ties have been more active in seeking export business than at any time in the past few years. This activity has resulted in securing the bulk of Indian, African and South American business in cotton ties.

In 1924 German mills booked considerably less than half the total tonnage of ties exported by the other European producing countries, France, Belgium and Luxemburg. This was largely the result of the difference in prices, German mills quoting £11 5s. per metric ton, f.o.b. Antwerp, or about $1.39 per bundle of 56 lb., while the French and Belgian prices were about $1.24 per bundle of 56 lb., f.o.b. Antwerp. Although there was still a considerable difference in prices quoted by Germany and the other makers of Europe in 1925, the German mills booked considerably more tonnage. This year German mills and the Saar booked about 15 per cent more than the combined tonnage of France, Belgium and Luxemburg, despite the continued difference in price of £1 10s. to £1 15s. per ton, about 16c. to 18c. per bundle of 56 lb. The German quotation today is $1.17 to $1.20 per bundle of 56 lb. and the French, Belgian and Luxemburg price from 85c. to 90c. per bundle, all f.o.b. port. Recently advance in value of the franc has brought the latter price to about $1 per bundle.

The principal German works manufacturing cotton ties are the Phoenix works and the Thyssen plant at Mulheim, both subsidiaries of the new United Steel Works. This year Austrian and Czechoslovakian mills have appeared as competitors for cotton tie business, and British ties have brought prices about 5s per ton higher than the German quotation.

JAPAN BUYING RAILS

Bids Opened by Government Railroads on 10,000 Tons—Sheet and Tin Plate Prices Too High

NEW YORK, Sept. 25.—Export markets continue only moderately active, with the larger business still coming from Japan. Chinese buying is small as a result of the unsettled political situation.

In Japan the Toho Gas Co. has opened bids on 193,000 ft. of black gas pipe, ⅜ to 2 in. in diameter, with British threads, but award is not yet reported. The Imperial Government Railways, which recently closed with a large Japanese export house for 193,000 tie plates (Illinois Steel Co. specified) has opened bids on 10,000 tons of 100-lb. rails. Another inquiry from the Government railroads, a lot of about 500 tons of large beams and channels, is reported placed in the United States.

There has been some inquiry for light gage black sheets, but in most instances the price ideas were too low to interest the American mills. Japanese merchants seem willing to place business at about $80 or $80.50 per ton, c.i.f. Japan, but the American market is firm at a minimum of $81 per ton. There is continued activity in small lots of tin plate, but in this market, too, Japanese offers are often too low in price to permit of business being closed. Exporters can sell at $5.55 per base box and less, c.i.f. Japan, but the export price of most mills is $5.70 to $5.75 per base box, c.i.f., except on large tonnages, such as are purchased by the Japanese oil companies.

Importers in the United States are competing for various outstanding contracts on reinforcing bars and a sizable business has been done recently in hoops and bands, orders ranging up to 500 tons and more. German hoops are understood to have been offered at 2.20c. to 2.25c. per lb., c.i.f. Atlantic port, and sales are reported to have been made at about 2.15c. per lb., base. The material is understood to have been open-hearth steel.

Business Analysis and Forecast

BY DR. LEWIS H. HANEY

DIRECTOR, NEW YORK UNIVERSITY BUREAU OF BUSINESS RESEARCH

Favorable and Unfavorable Factors Affecting Business May Be Summarized as Follows:

Favorable Factors

1. Large volume of retail trade.
2. August building contracts increased.
3. August automobile production increased.
4. High purchasing power of manufacturing labor.
5. Efficiency in production.
6. Low mercantile inventories.

Unfavorable Factors

1. The P-V Line continued downward in August.
2. Unfilled steel orders and the price of steel scrap have declined.
3. August railway freight traffic failed to make the usual seasonal gain.
4. Contemplated new building declined.
5. Foreign competition increasing; August exports gained less than usual.
6. Large manufacturers' inventories.

THOUGH showing fair seasonal gains, the trend of business is on the whole very mixed and irregular. Business activity and industrial production will clearly be large during the autumn months, but not much further expansion is probable (in the absence of improbable inflationary developments) and the outlook for 1927 is very doubtful. Profit margins are now in general so low that any further decline in commodity prices or curtailment in volume of production would probably have unfavorable results.

THE significance of the statement made a month ago that business is making a double top, much as the stock market is doing, is now clearly apparent. Our adjusted curve of bank debits in August rose to 168 per cent of the 1921 average against 154 per cent in July and compares with nearly 170 per cent at the preceding peak in March. Measured by this index, therefore, business has nearly recovered the ground lost between February and July. It is still too early to be certain how much further the recovery will go, but present indications are that the September volume of checks drawn will hardly go through the high level reached in March, making due allowance for seasonal variation. In the first two weeks of September, which included the Labor Day holiday, bank debits fell farther below the August average than was the case a year ago.

It is encouraging, however, that July and August have shown so much improvement and this improvement, as reflected in bank debits, has justified the anticipatory rise in the stock market during May and June. Already, however, business indexes are showing some of the hesitation which has characterized the stock market in recent weeks.

Railroad tonnage has failed to increase as much as usual. In August it was very large, and the earnings of the carriers which have reported thus far make a good showing. Nevertheless, the upward trend of the preceding months appears to have been checked and, when we deduct the usual sharp gains that are to be expected in August, the change for the month was downward. It is easily possible that July may prove to have been the peak month of the year.

In any case, the volume of buying and selling, in-

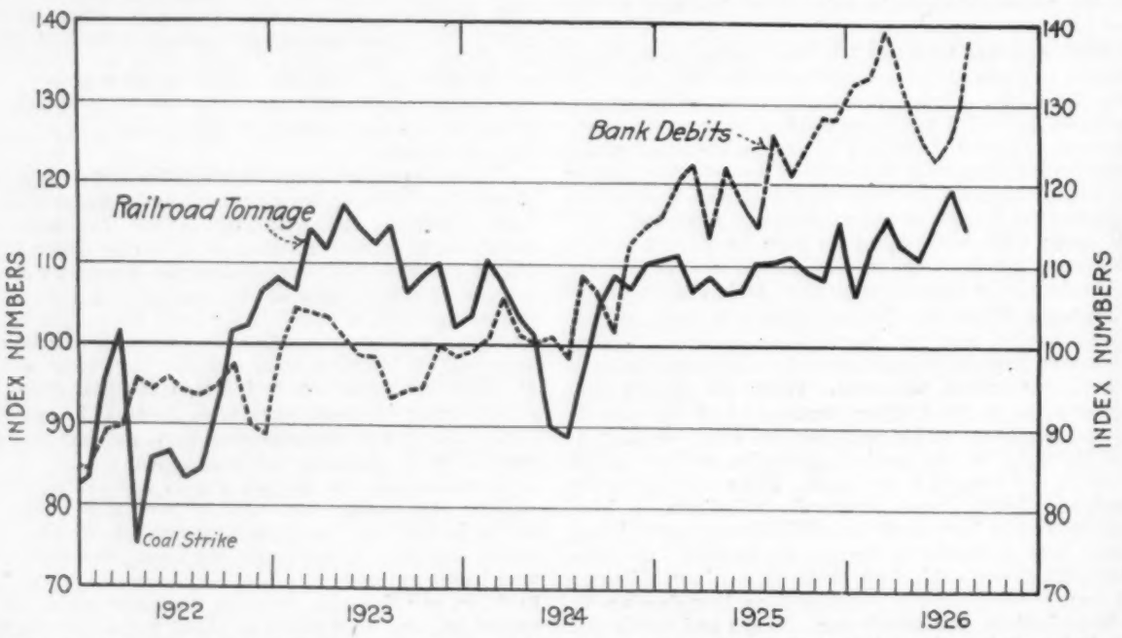


Fig. 1—July and August Showed an Encouraging Rise in Bank Debits, but Indications of September Are for a Drop. Viewed against the drop in railroad tonnage, measuring the physical volume of industry, there seems to be a dangerously high volume of buying and selling. (1921-5 *average* = 100)

In This Issue

Expansion in every department of activity characterizes Steel Treaters' Convention in Chicago.—Return to first convention city after seven years brings 100 per cent increase in floor space and number of exhibitors at steel and machine tool exhibition. —Page 907.

Decline in unfilled orders of Steel Corporation occurs with abnormal volume of ingot production.—First autumnal decline in years, high volume of speculative activity and seasonal decrease in railroad tonnage indicate to Dr. Haney that steel ingot output must soon be reduced.—Page 938.

Few skilled laborers among country's immigrants.—Only 33 metal workers were admitted in July while four left. Skilled iron and steel workers entering numbered 81 with 20 departures.—Page 927.

British prefer crucible to electric steel for high speed uses.—English paper before Steel Treaters' meeting emphasizes difficulty of controlling electric product and greater purity of raw materials in crucible steel.—Page 911.

American methods will replace primitive ox-cart and shovel in mining of manganese ore in Republic of Georgia.—Russian deposit, scarcely five miles square and containing considerable portion of world's supply, to be worked with modern mining methods. —Page 924.

France's "army of unemployed" contained only 500 persons in July.—Country provides work for three million Italians, Poles and other foreigners and keeps her own people busy, while Germany and England each have two million idle.—Page 922.

Electrolytic refining of metals finds increasing use as higher degrees of purity are demanded.—English metallurgist tells Institute of Metals that modern requirements are revolutionizing old methods, especially in copper and zinc products.—Page 926.

Gain in building contracts indicates high rate of actual construction during fall months.—Dr. Haney predicts active demand for structural steel during remainder of year as result of August gain in building awards. —Page 941.

Are hair lines necessarily dangerous in alloy steels?—Defects are prevalent in many sorts of special steels where failures in service are comparatively rare. Blame for hair cracks laid to over-oxidation in making of steel and to gas cavities arising from rapid cooling in sorbitizing.—Page 907.

New radial drill has 36 speed changes and 18 feeds.—Highly centralized control and automatic oiling of head provide minimum effort for operator. Unusual safety features are incorporated.—Page 929.

World's supply of manganese ore will last only 50 years.—African Gold Coast is being rapidly developed, while Russia and India furnish bulk of present consumption. America has scarcely any.—Page 942.

Brinell hardness test has limited accuracy, metallurgist tells steel treaters.—Application is often not constant in time or pressure, due to personal element in operation. Newly designed machine, motor operated and with push button control, may eliminate old defects.—Page 909.

Centrifugal casting of bronze gear blanks in English mills said to show all-round improvement over die casting.—Finished molds show extremely small grain size with little variation in structure and strength of varying sections.—Page 926.

Injuries sustained while employee is going to and from work covered by new Welsh compensation act.—Elasticity of interpretation will impose uncalled-for burden upon manufacturer.—Page 945.

France, prospering industrially, is irresponsible to national affairs.—With steel output 2,000,000 tons annually above pre-war levels and other industries showing corresponding gain, high turnover and shortage of labor are chief problems of industrialists.—Page 923.

Slow heating of gears to maintain uniform temperature throughout cross section is advocated.—Automotive engineers hear discussion of new practices in production of gears, with emphasis on selection of best adapted steel.—Page 919.

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Reviewing An Encyclopaedia

TO search closely through an encyclopædia and report the findings within the compass of a few pages describe in a way the publishing problem of covering the many sided conventions of the past several days. The American Society for Steel Treating by last Friday had loosed a deluge of technical information. This required continued close attention and rapid digesting to give a comprehensive idea of its character and had to be done in part at the very time the American Foundrymen's and allied associations were holding an international foundry congress at Detroit demanding the presence of qualified representatives of THE IRON AGE to report the events.

Our readers will observe that other meetings of interest also have been covered—the blast furnace executives, for example, and the electrical engineers of the steel industry. The instances serve to emphasize present-day demands on the technical business paper adequately to serve its readers.

For News Summary See Reverse Side

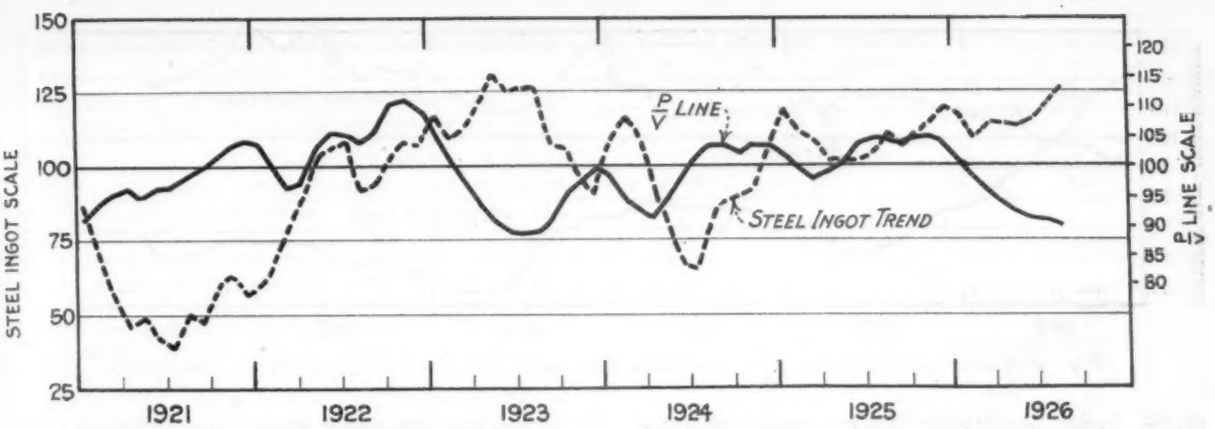

Fig. 2—The P-V Line, Representing the Ratio of Commodity Prices to the Physical Volume of Trade, Shows a Parallelism to Conditions of 1923, Suggesting an Imminent Halting in Steel Production

cluding speculative activity of all kinds, is now dangerously high in comparison with the physical volume of industry. This appears in the extent to which the bank debits curve has risen above the railroad tonnage curve. It hardly seems possible that this excess can continue long and a material recession in bank debits is to be expected within a few months.

P-V Barometer Predicts Reduced Steel Output

WHILE the indexes which are shown graphically in the first chart indicate that business is still at the high point in the cycle, our barometer curve, the P-V line, has fallen far below the peak which it reached toward the end of 1925. The situation continues to remind us of that which existed in 1923. Then the peak of the P-V line was followed by a halt in steel ingot production six months later and by a sharp decline in such production beginning in about nine months. Considering the abnormally high volume of steel production at present it seems likely that curtailment now will not be much longer delayed. Recent reports indicate that new business has been running behind shipments and certainly the business future is sufficiently doubtful to suggest the wisdom of reducing the steel output somewhat.

Unfilled Orders Barometer Hardly Favorable

THE two barometers shown in Fig. 3 hardly give a favorable impression. In the first place, the trend of the curve showing the rate of change in unfilled orders is rather sharply downward. This is due to the fact that, following the rising trend of the preceding three months, the unfilled orders of the Steel Corporation declined by over 60,000 tons in August. Furthermore, August usually shows a small gain of around 1 per cent and, therefore, an allowance for seasonal variation virtually increases the small decline that actually occurred.

Probably the declining trend of the rate of change in unfilled orders means that buying of steel fell off a little in August. *This is the first time in a good many years that our unfilled orders barometer has shown an autumn decline, especially after a period of advance in the early summer months.*

The price of heavy melting steel scrap at Pittsburgh averaged higher in August than in July, and the September average will probably be even a little higher; but the market has turned decidedly weaker of late and the current trend is downward. As is so often the case, a decline in the unfilled orders has again forecast the scrap market. The price of steel scrap, taken alone, is so sensitive that its weaker tone is in itself an unfavorable indication.

The average price of a group of representative steel stocks reached a peak in August. Thus far in September the average has shown a considerable decline. This is as forecast by the unfilled orders barometer and by the steel scrap market. The setback in steel stocks, in its turn, indicates that the speculative opinion of the outlook for the steel industry has become less favorable.

Continued Structural Steel Demand Likely

ONE of the most important factors in the steel industry lies in building activity. Such activity, as measured by the floor space in contracts awarded

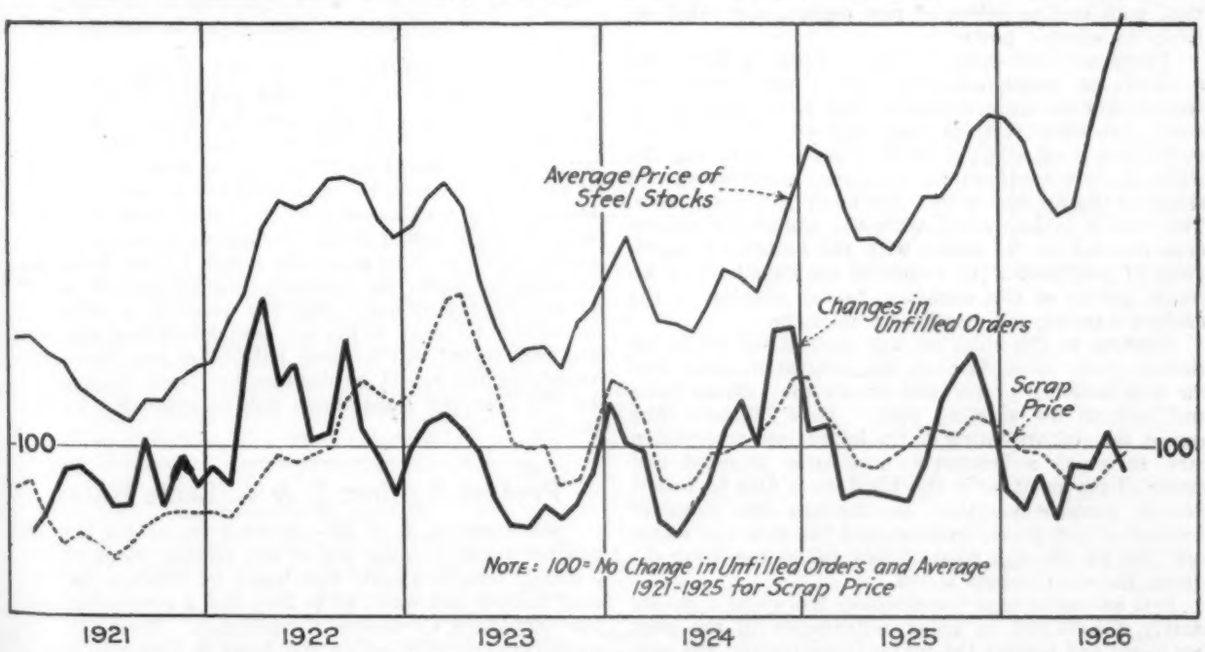

Fig. 3—The August Drop in Unfilled Steel Orders, September Weakness in Scrap Prices (not shown) and Declines from the Peak of Steel Securities Prices in August Are Collectively Taken as Hardly Favorable

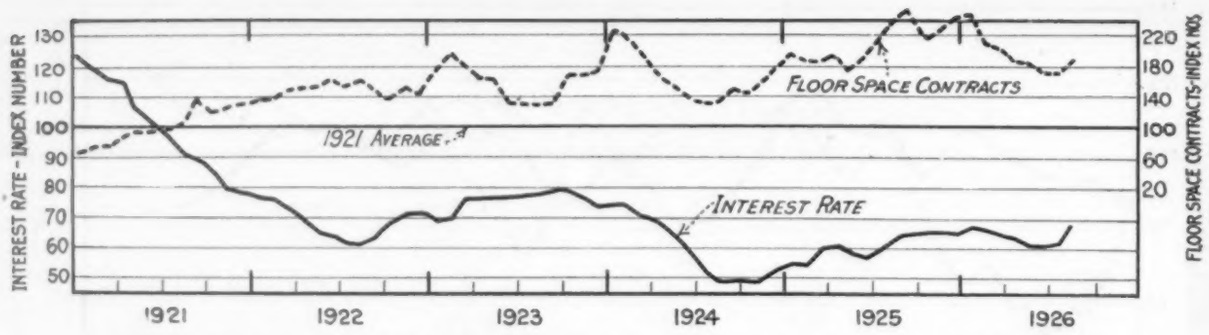

Fig. 4—The August Gain in New Contracts Forecasts Continued Large Building Construction

(F. W. Dodge Corporation figures), registered a considerable increase in August. Such a gain means not only that the steady decline of the preceding six months has been interrupted but also that the expansion was unusually great for the season. Nevertheless, it may well be doubted whether the upturn in new contracts will carry through. Contemplated new construction declined sharply in August. Residential rents continue to decline and real estate activity has fallen off. As the chart shows, too, money rates have resumed an upward trend which will tend to check speculative building later on. However this may be, *the gain in new contracts does forecast the continuation of a large volume of actual construction throughout the fall months, which should keep the demand for structural steel fairly active.*

Schedule of the next installments of the ***Business Analysis and Forecast,*** *by Dr. Lewis H. Haney, Director New York University Bureau of Business Research, follows:* ***Oct. 14****—Activity in Steel Consuming Industries;* ***Oct. 21****—Position of Iron and Steel Producers;* ***Oct. 28****—General Business Outlook.*

Visit Bethlehem's Cambria Plant

The Bethlehem Steel Co., on Saturday, Sept. 25, threw open the portals of its Cambria plant, Johnstown, Pa., on which in the past three years, or since its acquisition from the Midvale Steel & Ordnance Co., it has spent large sums of money, to some 600 visitors, who took advantage of an invitation extended the Association of Iron and Steel Electrical Engineers by L. R. Custer, general manager of the plant. The visitors saw not only the four new bar mills at the Gautier division, in which there was primary interest because of the electrical features of the mills, but were transported into all other divisions of the works in gondola cars converted temporarily into observation cars. The large throng was handled admirably by a corps of guides in the tour of the Gautier mills, which offer the latest thought in bar mill construction and operation, with cooling tables of new design, motivated entirely by electric power.

There are four mills, a 9-in., a 10-in., a 13-in. and a 14-in., on which are rolled sheet bars, slabs and sections for the underframes of cars and motor trucks, small structural sections, bars and wire rods. These mills have a capacity of 60,000 tons a month and the mills also are equipped for handling, warehousing and shipping the product with a minimum of manual labor. The visitor is impressed with the immensity of the area devoted to the mills; with the design for continuity of production; the numerous subways built to increase safety of the workmen, to say nothing of the modern lighting and ventilation methods.

Starting at the billet storage shed of the mills, the visitors were taken through the substation, then into the mill building proper and shown the various units and back to the starting point. Here luncheon was served, the visitors eating on the improvised observation cars, to which a locomotive was later attached and conveyed the party over the plant rails first to a new electric powerhouse, then on through the Franklin division of the plant, back around the new car shops and then on through what is now called the lower division, the old Cambria works.

It is estimated that the company has spent approximately $35,000,000 on plant betterments in the past few years and besides the major improvement, the new Gautier bar mills, there stands a 5-story power plant of the most modern design and containing the newest of equipment. The company has built one new blast furnace and rebuilt others, while there has been considerable expenditure on new by-product coke ovens.

Report on German Dumping Expected Soon

WASHINGTON, Sept. 28.—The preliminary report of the German-American commission at Berlin which inquired into the matter of imports of iron and steel products into the United States has been received by the State Department and turned over to the Treasury Department. The investigation was made under the countervailing section of the Fordney-McCumber tariff act to ascertain whether or not German imports had been the object of bounties which, it had been charged, were paid by the Raw Steel Syndicate of Germany on semi-finished and finished steel going to foreign markets.

The commission met on Sept. 20 to draft a complete report and it is expected that the latter will reach Washington soon. It will come by steamer. It is believed that the report may reach here this week, although the time of its arrival is not definitely known. It has been learned, however, that the report is unanimous. This fact has led to the belief that the commission has reported that no bounties are paid and that therefore there is no cause for action by the Treasury Department under the countervailing section. Whether or not the report deals with the question of dumping remains to be seen. It has not been determined whether the final report will be made public, but any statement regarding the report or decision that may be reached by the Treasury Department will be given out by the latter.

Protest Against J. & L. Scale Rates

WASHINGTON, Sept 28.—Another important protest against rates growing out of the establishment of the Jones & Laughlin scale was made by Chicago district steel makers last week, when they filed a complaint with the Interstate Commerce Commission. They ask for establishment of rates on the Jones & Laughlin scale, with appropriate differentials, to three zones of the lower peninsula of Michigan.

BLAST FURNACE DEVELOPMENT

Experiences with Carrie Stacks and Ore Concentration Feature Harrisburg Meeting

There have been more largely attended meetings of the Eastern States Blast Furnace and Coke Oven Association since its organization in 1921 than the fall meeting held at Harrisburg, Pa., Sept. 24, but none more interesting nor more carefully planned and carried out. There was a registration of 75 members and guests of the association, and a day of sightseeing as guests of the Bethlehem Steel Co., was concluded with a dinner in the evening at the Colonial Country Club, which was featured by an excellent paper on the merits and behavior of the large hearth blast furnace by James E. Lose, superintendent Carrie furnace, Carnegie Steel Co., Rankin, Pa.

The free discussion following left no question that the furnaces of the future would run strongly to the furnaces of wide hearth and of large capacity, but that local conditions and the kinds of ore to be used would make impossible adoption of the new design in all parts of the country. Eastern blast furnace operators with furnaces running chiefly on hard ores questioned that there would be the same success with the new type of furnace that had been attained on the soft Lake Superior ores in other parts of the Eastern half of the United States.

Changing Proportions of Stacks

It took ten years, Mr. Lose said, to bring about the increase from the furnace with hearth of 14 ft. to that of 18 ft., and ten years more to see a movement to even wider hearth furnaces. In building the first Carrie furnace to be changed over there was the influence of the furnaces of small hearth and the ratio of bosh angle to stock line, as well as the pitch of the bosh, was preserved. This furnace had a small shell, and when rebuilt had a hearth of 20 ft. 8 in., a bosh width of 24 ft. and a stock line of 17 ft., with a bosh angle of 80 deg. Running on coke made from 100 per cent high volatile coal, the output of the furnace over the first eight months of the year averaged, was 675 to 735 tons of iron per day, with only 3½ per cent excess scrap, or scrap not made by the furnace itself, and for one month it made a daily average of 734 tons.

In the second furnace rebuilt to larger capacity the hearth was increased to 21 ft. 6 in., the bosh to 24 ft. 9 in. and the stock line to 17 ft. 3 in., and there was an increasing of batter wall ratio, as it had been learned from operation of the first changed furnace that the batter designed to the ratio of older and smaller furnaces was not a proper measure of the expansion, and that the furnace must be more vertical to accommodate the larger volume and not interfere with the passage of the gas. In the second furnace the inwall ratio was 1 in. per ft., and with a pressure of 17 to 18 lb., and blowing 53,000 cu. ft. per min. and a blast temperature of 1400 deg., there was a production of 765 tons per day, with no excess scrap charged.

George Hohl, Bethlehem Steel Co., Bethlehem, Pa.; C. A. Meissner, chairman, blast furnace, coke oven and open hearth committees, United States Steel Corporation; H. S. Braman, Youngstown Sheet & Tube Co., Youngstown, Ohio; R. N. McEldowney, Bethlehem Steel Co., Johnstown, Pa., and Harry Saxer, Jones & Laughlin Steel Corporation, Woodlawn, Pa., contributed to the discussion. Some excellent results were attested on large hearth furnaces running on soft ores, but Mr. McEldowney dissented and the Eastern blast furnace men were dubious of results on imported or sintered ores.

Ore Concentration at Lebanon

The day was spent in visits to the Steelton plant of the Bethlehem Steel Co., and before luncheon, served at the Lebanon Country Club, there was an inspection of the ore concentration and sintering plant at Lebanon, where the visitors were shown the operation of the conversion of the hard Cornwall ores. Concentrator data, based on 1925 averages, showed that from crude ore running 42.43 per cent metallic iron, 2.32 per cent sulphur, 0.38 per cent copper and 0.016 per cent phosphorus, the ball mill discharge, all through No. 10 mesh, had produced the following results:

Iron Concs.

Fe	S	Cu	P
58.06	1.43	0.27	0.009

Sinter

Fe	S	Cu	P
57.55	0.22	0.19	0.032

Magnet Tails

Fe	S	Cu
16.00	3.50	0.65

Flot Copper Concs.			*Table Copper Concs.*		
Fe	S	Cu	Fe	S	Cu
25.00	20.00	30.00	35.62	34.14	2.50

In the afternoon the old Cornwall blast furnace, first built in 1742, and in excellent state of preservation, with the old wooden blowing tubs and the first steam blowing machine, was visited, and afforded a strong contrast with the furnaces described in Mr. Lose's paper. The next visit was at the old Cornwall ore mines, which have been worked for approximately 200 years and, until the opening of the Lake Superior deposits, furnished the largest part of the country's ore requirements. New drilling has disclosed an even greater deposit of these manganiferous ores about a mile from the present mines, and the operation is assured for years to come of the concentration and sintering plant at Lebanon.

Elected to Furnace and Coke Oven Association

Harry E. McDonnell, president of the association, presided at the evening exercises and announced the election to membership of L. H. Heckscher, assistant superintendent blast furnaces, Alan Wood Iron & Steel Co., Swedeland, Pa.; W. A. Marsh, superintendent coke plant, Michigan Alkali Co., Wyandotte, Mich.; Chandler Markell, assistant superintendent blast furnace, Republic Iron & Steel Co., Youngstown; Mathew J. Komp, superintendent of heating, Carnegie Steel Co., Clairton, Pa.; Edward Jones, manager Globe Iron Co., Jackson, Ohio; Stokes Ferguson, superintendent blast furnaces, American Rolling Mill Co., Columbus, Ohio, and D. B. Stauft, general manager Bourne-Fuller Coke Co., Uniontown, Pa. The present membership numbers 225 blast furnace and coke-oven operating officials of companies making 91 per cent of the pig iron produced east of Detroit and 91 per cent of the by-product coke produced in the same area, Mr. McDonnell stated.

Among others present were Philip E. Angle, Carnegie Steel Co., Duquesne, Pa.; Verne W. Aubel, Hanna Furnace Co., Detroit; James H. Bell, Algoma Steel Co., Sault Ste. Marie, Ont.; H. A. Berg and L. B. Weidlein, Arthur G. McKee Co., Cleveland; James A. Canning, Jr., E. C. Taggert, W. G. Binder, C. P. Turner, C. W. Thornton, James J. Neagle, B. W. Winship, F. A. Robbins, Jr., G. R. Comstock and R. L. Gillespie, Bethlehem Steel Co., Steelton, Pa.; H. S. Braman, Frank Farrell, F. D. Schreiber and G. T. Williams, Youngstown Sheet & Tube Co., Youngstown, Ohio; J. R. Comstock, Hanna Furnace Co., Cleveland; L. C. Crewe, Robesonia Iron Co., Robesonia, Pa.; John Drewson and Harry Saxer, Jones & Laughlin Steel Corporation, Pittsburgh; L. T. Edwards, Bethlehem Steel Co., Lebanon, Pa.; E. I. Fargo, Lynn Gas & Electric Co., Lynn, Mass.; J. S. Frazer and F. T. Moran, Trumbull-Cliffs Furnace Co., Warren, Ohio; W. McK. Green, Cleveland-Cliffs Iron Co., Cleveland; A. H. Harris and W. E. Keogh, Bethlehem Steel Co., Lackawanna, N. Y.; Chandler Markell, Republic Iron & Steel Co., Youngstown, Ohio; William Tiddy, Rainey-Wood Coke Co., Swedeland, Pa.; C. N. Hickok, M. A. Hanna Co., Cleveland; George Hohl, Bethlehem Steel Co., Bethlehem, Pa.; John J. Howard, E. J. Lavino & Co., Philadelphia; J. A. B. Lovett, H. J. Rose and D. M. Rugg, Koppers Co., Pittsburgh; E. L. Brokenshire and A. E. Danforth, Ogiebay, Norton & Co., Cleveland; R. N. McEldowney, Bethlehem Steel Co., Johnstown, Pa.; James McIntosh and H. F. Schilling, Carnegie Steel Co., Clairton, Pa.; Mr. Alteri, New England Fuel & Transportation Co., Everett, Mass.; C. R. Meissner, Weirton Steel Co., Weirton, W. Va.; W. H. Nash, Wickwire Spencer Steel Co., Buffalo; Edgar J. Reilly, William B. Pollock Co., Youngstown, Ohio; W. A. Marsh, Michigan Alkali Co., Wyandotte, Mich.; P. S. Savage, Donner-Hanna Coke Corporation, Buffalo; J. N. Sherer, Reading Iron Co., Reading, Pa.; W. E. Valentine, Cascade Coke & Coal Co., Sykesville, Pa.; C. C. Watson, Foundation Co., Troy, N. Y.; W. H. Smith, Lawrenceville Bronze Co., Pittsburgh; J. Whiting, Donner Steel Co., Buffalo; P. G. Wilander, Wheeling Steel Corporation, Portsmouth, Ohio; Mr. Thatcher, By-Product Coke Corporation, Chicago; C. L. Wyman, Pickands-Mather Co., Cleveland; Robert M. McClurkin, American Radiator Co., North Tonawanda, N. Y.

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For Better Steels

FROM the modest convention and exposition of 1919 in Chicago, the meeting of the American Society for Steel Treating in the same city last week represents an advance nothing short of phenomenal. Each year the society has furnished a fresh text for comment on its achievements, notwithstanding that with every added year the job of exceeding itself has been more and more difficult. Naturally membership cannot continue to increase by leaps and bounds, when once the great majority of eligible men have allied themselves with the movement. But each year has seen a healthy gain in the society's influence, with more than 4000 members now on its rolls, while the strength of its present appeal to collateral industries may be gaged by the figures of exposition floor space—85,000 square feet last week against 6500 square feet seven years ago.

From the wide range and high quality of the papers and discussions, as fully reported on other pages, it may fairly be said that this commercial expansion has not been gained at the expense of development on the technical side. While no radical departures were announced, there were interesting accounts of new and better work in lines already well pioneered. The society's recent decision to extend its activities to non-ferrous metallurgy was signalized by three excellent papers bearing on that field.

The steel treaters have left to the organizations that for years have dealt with them, the processes of iron and steel production. Yet it was inevitable that the researches of so many progressive men in the interest of a longer life and better service for steel entering into the products of the metal-working industries should reach back to the rolling mill and the melting furnace. Several of the papers at Chicago are reminders of the part the testing engineers of important railroads took in the discussions of 20 years ago that led to the modification of rail mill practice. But the indications are that latter-day steel makers have taken a leaf from the book of the old-time rail manufacturers and to a greater extent than ever are producing steels that as they go from the mill have the qualities called for by the service to which they will be put.

No Trend in Wages

WAGE rates in the United States in the past two years have exhibited a remarkable steadiness relative to the fluctuations common in the past. This fact leads some men to expect no change in future, to dismiss the subject until concrete developments give an indication, and leads others to seek credit by predicting the time and direction of the next change. Along the latter line is the statement made at a recent convocation at Wellesley Hills, in substance that there will be no change for six months, but that the next change will be downward.

If the subject be considered at all it should be in the light of the very important facts as to the distribution of unionism. It is well known that unionism is found chiefly in the building trades, in coal mining and in transportation, and it is plain that these lines present totally different positions. The course of affairs in the past two years shows that there is no common influence for them. It would be easy and inaccurate to foresee a change in wages in one class of occupation and assume that a general trend would thereby be shown or be induced.

In order to obtain a quantitative conception, a compilation may be made from a recent study by the Bureau of Labor, presented in the August Monthly Labor Review. While there are some loose ends, this indicates that the distribution of unionism in the United States is substantially as follows:

	Number	Per Cent
Building trades	1,123,825	25
Transportation	1,155,250	26
United Mine Workers	500,000	11
All other	1,664,448	38
Total	4,443,523	100

There are very wide divergences between the positions of these classes of workers. The building tradesmen are fully employed and have had the benefit of a long period of great building activity, making up a housing shortage. If the housing shortage has been eliminated, as some contend, the position of the building trades may be different in future. The circumstances are peculiar to that line of activity. The United Mine Workers, in contrast, have not been at all well

employed. The bulk of the coal mines is non-union. The wage rates are quite different. That puts coal mining strictly in a class of its own as to prospects.

In transportation there is a different condition again. The wage rates are practically put under arbitration and the prospect is that changes will not be initiated but rather that wages in transportation will follow conditions.

The building trades unionists and the organized coal miners may attract much public attention, but in addition to being in classes by themselves as to conditions, they represent but a small proportion of all workers. The total of all unionism is but a small proportion. A recent estimate of the number of "gainfully employed" made by the Policyholders' Service Bureau of the Metropolitan Life Insurance Co. put the total at 46,000,000. Counting out professional service, domestic service and personal service we have 40,000,000, trade unionism representing 11 per cent of this. The remaining 89 per cent is made up very largely of employers and employees who are actively or passively disposed to let things alone. Observations as to special classes of employment ought not to carry any inference as to the great majority, so differently circumstanced.

What Size Exposition?

SUPERLATIVES have so often been needed to describe the annual gatherings of the steel treaters' organization that there will be no surprise at their repetition in this issue. Notably the exposition at Chicago last week comes in for this treatment, being the greatest of them all. There is no need to marshal the figures for proof; some are given in the account. What leads to comment here is that rather frequently the opinion was expressed that the show had become too large and was unwieldy.

It is doubtful that these views were well deliberated. Unwieldiness was thought of as inevitable, yet smoothness of operations and well-ordered control were seen everywhere. Preplanning no doubt accounts for the successful meeting of the issue. Bigness is relative and it would be a difficult thing to say just when a show becomes too big to cease to be most effective. The fact is probably lost sight of that exhibitions such as Chicago's do not cater to, let alone interest, the average person. Visitors come for a definite purpose and they feel obliged to investigate matters of special interest just as much as exhibitors feel obliged to get their attention. As likely to be all inclusive, size is actually attractive.

The crowd, in a word, is selective in its tastes and is not necessarily inconvenienced by size. It does desire, of course, a quick and easy way to get to given sections. Therefore what might be said against the Chicago show is that while it was all on one level and without dead-end side aisles, and every part was easy to find, it was so long and narrow that to reach displays at the end farthest from the entrance was a good deal of an effort. The same exhibition area in another form without extreme distances would have lessened the impression of formidable size.

Simultaneous technical sessions on heat treating, metallurgy and metal working, afforded by meetings of other societies scheduled for the purpose, quite justify the scope of the exposition. And if later conventions in the same way give a double attraction to technicians in each of the three divisions, a show of like size will be warranted, particularly if thought is given to the factor of fatigue.

An "Advanced" Compensation Act

NEW SOUTH WALES is in an industrial ferment because of its latest workmen's compensation act. Some of its provisions are pernicious almost to the point of being ruinous, owners declare, according to a summary of the situation received by the State Department at Washington.

In rates of compensation for injury or death the law does not go much, if any, beyond the American and British practice. It extends protection to the agriculturalists, something not yet accomplished in the United States because of the united opposition of the farmers and grazers. The section covering liability for occupational diseases appears to include diseases of every description contracted in employment, though information so far received does not make this entirely clear. Another radical provision is that when work is being done by a contractor the owner for whom the work is undertaken is held equally responsible in case of an accident to an employee of the contractor. This vitally affects the building industry and to a less extent others.

But the most vicious provision in the new law is that which makes the benefits of workmen's compensation cover injuries sustained while an employee is going to and from his work. Through accidents wholly outside of industry a serious additional burden is imposed upon the manufacturer. The clause lugs in automobile and other street accidents, even though due to recklessness, also drownings, falls and the hundred and one other hazards which make the general accident rate much higher than that of industry.

Naturally fraud will play its part, as an injured man or woman, or the heirs, may interpret time and place of accident to stretch the statutory meaning of the terms "journey to" or "journey from." The journey might be presumed to begin when a man left an upstairs apartment for the shop and fell down stairs.

Legislation affecting the relations of employer and employee has a way of spreading from one country to another, just as it has spread from State to State in the United States. In the matter of extending compensation beyond the hours of actual employment, probably the Federal and State constitutions would stand in the way. Yet, already in some States, notably in Connecticut, cases have been decided against the owners, though the accidents were entirely apart from the plant. In line with these decisions, if a manufacturer operated a bus service in conveying employees between the city and a suburban factory, in the effort to maintain his working force, an injury sustained in the course of such travel would make him liable for compensation payments.

Now that the precedent has been established of putting practically all hazard of the worker upon industry, even though the sponsor is a short-sighted labor party in the Antipodes, it may be heard from next in legislative halls of the United States. It deserves enough consideration here to have it listed with some other South Sea innovations in industry that are at odds with the American sense of justice.

Coke as Domestic Fuel

STATISTICS of coke production and sales in 1925, just issued by the Bureau of Mines, strongly support the contention made in this department of THE IRON AGE last week, that there is not enough by-product coking for the public; that up-to-date progress along that line has been very slow. The year 1925 embraced a large part of the anthracite suspension, giving coke a fine opportunity to expand its market as domestic fuel, yet the 1925 sales of coke for domestic use exceeded those of 1924 by only 1,525,109 net tons, that increase being equivalent to only 2.9 per cent of the amount of domestic anthracite estimated to have been consumed in 1923. The figures bearing on this subject are as follows for the two years:

Coke—Net Tons

	1924	1925
Produced:		
By-product	33,983,568	39,912,159
Beehive	10,286,037	11,354,784
Total	44,269,605	51,266,943
Sold for domestic use:		
By-product	2,812,771	4,085,068
Beehive	139,886	392,698
Total	2,952,657	4,477,766

The increase in total production of coke from 1924 to 1925 was, of course, due mainly to improved industrial conditions, chiefly the larger production of pig iron. Hence it would not be fair to the subject to refer to the smallness of the increase in percentage of domestic coke to total coke. Domestic fuel requirements are presumably much the same from year to year. The slight increase in population may be more than offset by improved house heating appliances.

The salient feature of the showing is the smallness of the tonnage increase in domestic coke, only 1,525,109 net tons, which as noted above was only 2.9 per cent of the domestic anthracite in 1923. Last February the Bureau of Mines issued a statement of coal consumed in 1923, which set the consumption for domestic purposes at 52,344,000 tons of anthracite and 66,400,000 tons of bituminous, a total of 118,744,000 tons. This was equal to 18 per cent of the total production in that year.

The coke sold for domestic use in 1925, 4,477,766 tons, was 8.7 per cent of the total coke produced. This must be regarded as a small proportion considering the circumstances. It is true that about five-sixths of the by-product coke is produced by blast furnace interests and only one-sixth by others, but the steel trade well knows that during the anthracite suspension some of the steel companies did supply domestic fuel, indicating that this is quite feasible.

Allowing for ovens abandoned during 1925, the nominal annual capacity of by-product ovens at the beginning of this year was somewhat under 50,000,000 net tons of coke. Some ovens have been completed since, and the summary presented in THE IRON AGE last week (page 856) showed a capacity of 7,331,085 tons of coke under construction. With an allowance of 10 per cent for practical capacity under nominal capacity there will be more than 50,000,000 tons actual capacity.

FEARS FOREIGN COMPETITION

Threat of Increasing Efficiency of European Plants—Upholds Immigration Law

"We have been having things all our own way for four or five years. Unless we appreciate the approaching changes in Europe, we shall find ourselves living in a fool's paradise," said John V. W. Reynders, consulting engineer, New York, in an interview with a representative of THE IRON AGE. Mr. Reynders, formerly vice-president of the Pennsylvania Steel Co. and past president of the American Institute of Mining and Metallurgical Engineers, recently returned from an extended trip abroad.

"When European industry gets on its feet, aided extensively by working capital advanced by American bankers," he continued, "our high cost economic structure will be imperilled and our industrial concord, which is founded on prosperity, will be subjected to a kind of test to which we have been quite unaccustomed. It is certain that the effectiveness of our tariff barriers in protecting home markets for the American steel industry will be brought into question. Contrary to popular impression, the steel industry is not surrounded by a wall, although there are a few 'protecting bunkers' in front of our home greens, which may compel foreign competitors to use a niblick now and then instead of a brassie. That they are playing close to 'par' is evident from the fact that foreign steel is being laid down, duty paid, at our ports not at $1, but at $10 a ton, below domestic prices. Moreover, in the world markets, where America cannot afford to lose a position attained after many years of enterprise, our mills must meet those of Europe on an equal basis.

"By no means can we continue to depend on our superiority in plant facilities or enjoy the exclusive benefits of quantity production. German works which I visited were fully as modern and well equipped as any in this country, and what is more, their labor receives but a fraction of the wages paid to the American workman. Belgian and French plants are not lagging far behind. In Great Britain the steel industry is crippled because of the coal strike, but no prospective settlement of that dispute is likely to permit British steel works to meet American or Continental competition until the entire industrial structure has been reorganized in keeping with fundamentally altered economic facts. The output of the British miner is only one-quarter of that of the American mine operative. To be sure, the coal seams in Great Britain are deep and often thin, but such is also the case to a large extent in Germany where, however, greater progress has been possible in mining methods and tonnage outputs.

Foreign Competition Increasingly Severe

"But whatever the future may hold in store for any particular section or district, the reality of increasingly severe competition from Europe as a whole cannot be ignored. Regardless of tariff obstructions or temporary commercial inhibitions, prices, like water, are ultimately bound to attain a common level. Whatever that level may finally be, American industry will adjust itself to it. We are far from having reached the possibilities of cheap manufacture, and important

developments are in the course of making even now. Persistent effort must be directed toward improvement in methods and equipment in the world race to reduce costs, backed up by a financial position sufficiently strong to place into operation every advance in the art.

Rigid Enforcement of Immigration Law Essential

"Paradoxical as it may seem, in view of the handicap which American industry must overcome in this new competitive era, the strongest impression I gained abroad was the necessity for rigid enforcement of our immigration law. It is true that immigration from the countries of eastern and southern Europe is sharply restricted, but after close observation of the eastern European peoples in their native environments, I have become convinced that the quotas under which they are admitted to this country are not any too low, if low enough. These races in general are unfit timber for American citizenship. Usually of low mental capacity and accustomed to radically different political and economic conditions, they are incapable of comprehending the significance of American institutions.

Intelligent, Loyal Citizenship More Important Than Cheap Labor

"As a steel company executive some years ago I held just the opposite view of immigration. I was then impressed with the desirability of plentiful common labor. Today I realize that an intelligent, loyal citizenship is much more important to our national welfare. The dumping of low-grade aliens into our population materially adds to the costs of our courts and the administrative branches of our governments. As a means of combating crime alone, still further restriction of immigration would be in order. By referring to police records and compiling data showing the sources of immigrants convicted of crime, the quotas of those sections of Europe which are conspicuous in sending us undesirables could be proportionately reduced.

"While immigration has a definite relation to crime, it also has an important influence on our economic stability. Of late we have taken pride in the spirit of good-will which has grown up between employers and employees. The real test of industrial good feeling, however, will come when this country enters a period of business depression. At such a time, which may not be remote, the quality of our citizenship will be put on trial. There is real cause for fear that, under those conditions, the undigested elements in our population, ignorant and without traditions of loyalty to our institutions, will become the prey of unscrupulous agitators bent on radical and destructive programs."

MYSTIC FURNACE BLOWN IN

President Coolidge Lights the Fire for the First Coke Pig Iron in the Bay State

President Coolidge pressed a button at the White House on Monday, Sept. 27, and an instant later a flash on the hearth of the new blast furnace of the Mystic Iron Works, at Everett, Mass., told 500 onlookers that pig iron manufacture in the Bay State had begun again after having lapsed for two or three generations. The invitation of the Massachusetts Gas Companies to the blowing-in ceremony said that it would "inaugurate the manufacture of pig iron in New England," and that was the fact, if coke iron were meant. Of small charcoal blast furnaces Massachusetts had quite a number over a period of two centuries. At Lynn in 1645 Thomas Dexter and others were successful in the first attempt in America to make "sowe iron and other castings in a blast furnace," and as late as 1826 there were several charcoal furnaces in the counties of Plymouth and Bristol.

The Mystic Iron Works is an enterprise of the Massachusetts Gas Companies and the latter corporation has in Everett a peninsula of 325 acres between the Island End River and the Mystic River. The site is about three miles distant from South Station, Boston, and on it have been built in succession the coke oven plant of the New England Fuel & Transportation Co., the tar plant of the Barrett Co., the coal handling plant of the New England Coal & Coke Co., the water gas plant of the Boston Consolidated Gas Co., and the refinery of the Beacon Oil Co. Now under construction are 51 additional by-product coke ovens of the Wilputte type. The blast furnace was built on the designs of Freyn, Brassert & Co. and successors, Chicago.

Ground was broken for the new blast furnace on Sept. 15, 1924. A vast amount of work had to be done before construction could begin. A year was spent in dredging the channel, 700,000 cu. yd. being taken from the bed of the Mystic River to a depth of 30 ft., below mean water, giving a channel 200 ft. wide and 2100 ft. long for bringing 10,000-ton ore vessels alongside the wharf. The ore yard is over an old marsh area and this was filled in to a depth of 26 ft. to bring the grade of the ore yard 17 ft. above mean low water, fully to protect the ore from salt water.

The furnace is 88 ft. high. Bosh diameter is 22 ft. 6 in. and hearth diameter 17 ft. It will produce 400 to 500 tons of pig iron a day. There are three stoves, 22 ft. in diameter and 100 ft. high. Blowing equipment consists of two turbo blowers each of 5000 hp. Electric plant consists of two turbo generators of 750 kw. at 3600 r.p.m. for 2300 volts a.c. and two 500-kw. motor generators for 250 volts d.c. The boiler house has six 800-hp. boilers.

Three unloaders lift ore and limestone from the ships and discharge it into a 10,000-ton concrete bin, from which the ore bridge, 450 ft. long over all and with clear span of 250 ft., handles the ore into the storage yard or directly to the stock bins. At present 120,000 tons of foreign ore is in stock in four piles, two of African ores, one of Swedish and one of Newfoundland (Wabana). Coal comes from the Pocahontas field, the company's own barges bringing it from Virginia port. Limestone is brought from Rockland, Maine. Operation of the furnace is in charge of H. J. Briney, formerly superintendent of the Replogle Steel Co. furnaces at Wharton, N. J.

Monday's blowing in brought together a large company of guests from Boston and other cities, the Boston party representing financial, railroad and other interests. Pig iron producers from other districts were present, also many New England foundrymen. All the visitors were impressed with the plant as representing the last word in blast furnace construction, also with the scale of the outlay involved in securing every economy in latter-day pig iron manufacture.

At the moment of blowing in, the furnace was christened by the daughter of Vice-President and General Manager Thomas W. Kennedy, with the breaking of a bottle of apollinaris water. Later luncheon was served and remarks were made by J. L. Richards, chairman, and W. E. McKay, president Mystic Iron Works.

Among the visitors from a distance were William A. Rogers, Buffalo, and C. S. Robinson, vice-president Youngstown Sheet & Tube Co., Youngstown, Ohio. Mr. Rogers recalled the last blowing in of a furnace by a President of the United States. William McKinley at his home in Canton, Ohio, on Nov. 5, 1896, completed a circuit that lighted the new B furnace of the Tonawanda Iron & Steel Co. at Tonawanda, N. Y. This was three days after Mr. McKinley's election. The furnace is now owned by the American Radiator Co.

Production of Files and Rasps

WASHINGTON, Sept. 28.—Files and rasps produced in 1925 by 37 establishments reporting to the Department of Commerce were valued at $13,174,030. Other products produced by these establishments were valued at $353,673, the total of all products being $13,532,703. This total represents a decrease of 0.2 per cent as compared with $13,565,444 in 1923.

Iron and Steel Markets

Some Reduction in Unfilled Orders

Steel Shipments at a High Rate in September—Rail Requirements Are Large—Northern Pig Iron Tending Upward as Coke Advances

CONTINUANCE of the September rate of steel production and shipment into October is generally indicated, though in several products this will mean, as has been the case this month, some reduction in the total of unfilled orders.

In respect to prices and production maintenance of the record of the past quarter is the extent of producers' hopes for the fourth quarter, whereas in the last three months of 1925 prices advanced and output increased.

Railroad buying continues to figure largely in forecasts of October orders, though there will be little actual rolling on these next month. Some roads are figuring on more rails than in several years. The Santa Fe requirements are put at 135,000 tons, and among Chicago estimates are 80,000 tons for the Illinois Central, 50,000 tons for the St. Paul, 45,000 tons for the Rock Island, 42,000 tons for the Burlington. Other tonnages discussed tentatively are 35,000 for the New Haven, 55,000 for the C. & O., 75,000 for the L. & N., apart from the 200,000 commonly expected from the Pennsylvania and 240,000 from the New York Central.

It is to be remembered that fall contracts of rails in excess of 1,000,000 tons are not unusual and that rail business commonly compensates for seasonal declines elsewhere.

With the appearance of an inquiry of 1500 cars for the St. Paul and authorization of 1500 cars by the Louisville & Nashville, interest is revived in the possibility of improved equipment buying. The Missouri Pacific is expected to inquire for 3500 and the Delaware, Lackawanna & Western for 2000. The Illinois Central's requirements may also be made known soon.

Consumers of bars, plates and shapes have specified well on the business they placed in the quarter now expiring, but as a rule are not covered for the full fourth quarter, seeing no prospect of a higher market than 2c., Pittsburgh.

Sheet mills have done very well in recent bookings and more of them are adopting the $2 advance. Independent makers booked 100,000 tons more in September than in August and some are booked eight to ten weeks ahead.

Tin plate operations are close to capacity but due in part to advancing of orders scheduled for rolling later. In view of the record-breaking season for canners it is questioned whether the carry-over will not be a factor in 1927.

Steel requirements for building construction continue in fair volume, seeing that many fabricating shops cannot promise deliveries until late fall. The week's awards were close to 30,000 tons. About 8000 tons was taken for the Pittsfield Building in Chicago.

Purchase of 2500 tons of concrete reinforcing bars for two Staten Island, N. Y., bridges developed price competition in which some of the larger mills did not engage, and the order went to a small Pennsylvania mill at a concession.

Automobile plants are going ahead at about their recent pace, but most builders are buying steel and parts only for early delivery and makers of forgings and castings are being pressed for shipments.

A firmer coke market has helped to stiffen pig iron prices in the Pittsburgh and Valley districts. Eastern Pennsylvania furnaces are also asking an advance. The blowing in of the new furnace at Boston is more than offset by the going out of several merchant stacks.

Connellsville coke production is held down by the drawing of labor from that district to mines paying the full union rate. These latter are getting an increasing export business at good prices.

Rejections of thousands of tons of melting steel scrap by a large Eastern steel company have flooded the East with scrap that has gone begging. A purchase at $16.50, delivered, brings the eastern Pennsylvania quotation down 50c. a ton. At Pittsburgh the scrap market is weak, but with no marked change in price.

Business in castings fell off in August but the year so far is ahead of the same period of 1925. Bookings of commercial steel castings have averaged 84,730 tons a month this year, against 72,915 tons last year. The monthly average of malleable castings was 54,375 tons to Aug. 31 this year; in 1925 it was 53,560 to the same date.

Imports of pig iron and steel are growing. For the eight months ended with August they were 786,850 tons, or 170,000 tons more than in 1925 to Aug. 31. The August total was 91,578 tons against 82,411 tons in July. Germany leads in both pig iron and steel, supplying 24,148 tons in August and 176,971 tons in the eight months.

Exports declined to 171,588 tons in August from 194,717 tons in July. For the first eight months the total was 1,394,888 tons, an increase of almost 225,000 tons over the same period last year.

Japan is in the market for sheets, structural material, pipe and tin plate but is bartering for lower prices. An active inquiry covers 10,000 tons of 100-lb. rails for the Imperial Government Railways. The freight on European pig iron to Japan was recently reduced from 35s. to 30s. a ton.

THE IRON AGE composite prices remain unchanged. Pig iron is $19.46 per gross ton, a decline in Birmingham foundry iron being offset by an advance in the Valleys. Finished steel is 2.439c. per lb.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At Date, One Week, One Month, and One Year Previous

For Early Delivery

Pig Iron, Per Gross Ton:	Sept. 28, 1926	Sept. 21, 1926	Aug. 31, 1926	Sept. 29, 1925
No. 2 fdry., Philadelphia	$21.76	$21.76	$21.76	$21.76
No. 2, Valley furnace	**18.00**	17.50	17.50	19.00
No. 2, Southern, Cin'ti	*23.69*	24.19	24.19	23.05
No. 2, Birmingham	*20.00*	21.00	21.00	18.50
No. 2 foundry, Chicago*	21.00	21.00	21.00	21.50
Basic, del'd, eastern Pa.	20.75	20.75	20.75	21.00
Basic, Valley furnace	17.50	17.50	17.50	18.50
Valley Bessemer del'd P'gh	20.26	20.26	19.76	21.26
Malleable, Chicago*	21.00	21.00	21.00	21.50
Malleable, Valley	**18.00**	17.50	17.50	19.00
Gray forge, Pittsburgh	**19.26**	18.76	18.76	20.26
L. S. charcoal, Chicago	29.04	29.04	29.04	29.04
Ferromanganese, furnace	88.00	88.00	88.00	115.00
Rails, Billets, etc., Per Gross Ton:				
O.-h. rails, heavy, at mill	$43.00	$43.00	$43.00	$43.00
Light rails at mill	**36.00**	33.00	34.00	36.96
Bess. billets, Pittsburgh	35.00	35.00	35.00	35.00
O.-h. billets, Pittsburgh	35.00	35.00	35.00	35.00
O.-h. sheet bars, P'gh	36.00	36.00	36.00	35.00
Forging billets, base, P'gh	40.00	40.00	40.00	40.00
O.-h. billets, Phila.	40.30	40.30	40.30	40.30
Wire rods, Pittsburgh	45.00	45.00	45.00	45.00
	Cents	Cents	Cents	Cents
Skelp, gr. steel, P'gh, lb.	1.90	1.90	1.90	1.90
Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia	2.22	2.22	2.22	2.12
Iron bars, Chicago	2.00	2.00	2.00	1.90
Steel bars, Pittsburgh	2.00	2.00	2.00	2.00
Steel bars, Chicago	2.10	2.10	2.10	2.10
Steel bars, New York	2.34	2.34	2.34	2.34
Tank plates, Pittsburgh	1.90	1.90	1.90	1.80
Tank plates, Chicago	2.10	2.10	2.10	2.10
Tank plates, New York	2.24	2.24	2.24	2.04
Beams, Pittsburgh	2.00	2.00	2.00	1.90
Beams, Chicago	2.10	2.10	2.10	2.10
Beams, New York	2.34	2.34	2.34	2.24
Steel hoops, Pittsburgh	2.50	2.50	2.50	2.40

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

Sheets, Nails and Wire,	Sept. 28, 1926	Sept. 21, 1926	Aug. 31, 1926	Sept. 29, 1925
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 24, P'gh	3.00	3.00	2.95	2.95
Sheets, black, No. 24, Chicago dist. mill	3.10	3.10	3.10	3.15
Sheets, galv., No. 24, P'gh	3.85	3.85	3.80	3.75
Sheets, galv., No. 24, Chicago dist. mill	3.95	3.95	3.95	3.80
Sheets, blue, 9 & 10, P'gh	2.30	2.30	2.30	2.25
Sheets, blue, 9 & 10, Chicago dist. mill	2.40	2.40	2.40	2.40
Wire nails, Pittsburgh	2.65	2.65	2.65	2.65
Wire nails, Chicago dist. mill	2.70	2.70	2.70	2.70
Plain wire, Pittsburgh	2.50	2.50	2.50	2.50
Plain wire, Chicago, dist. mill	2.55	2.55	2.55	2.55
Barbed wire, galv., P'gh	3.35	3.35	3.35	3.35
Barbed wire, galv., Chicago dist. mill	3.40	3.40	3.40	3.40
Tin plate, 100 lb. box, P'gh	$5.50	$5.50	$5.50	$5.50
Old Material, Per Gross Ton:				
Carwheels, Chicago	$15.25	$15.25	$15.50	$17.50
Carwheels, Philadelphia	17.50	17.50	17.50	18.50
Heavy melting steel, P'gh	17.50	17.50	18.00	18.00
Heavy melting steel, Phila.	*16.50*	17.00	17.00	17.00
Heavy melting steel, Ch'go	*13.50*	14.00	14.00	16.00
No. 1 cast, Pittsburgh	16.25	16.25	17.00	17.00
No. 1 cast, Philadelphia	*17.50*	18.00	18.50	18.00
No. 1 cast, Ch'go (net ton)	*16.50*	17.00	17.00	17.75
No. 1 RR. wrot. Phila.	17.50	17.50	18.50	18.00
No. 1 RR. wrot. Ch'go (net)	13.50	13.50	13.50	14.50
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	$3.50	$3.50	$3.15	$3.50
Foundry coke, prompt	4.50	4.50	4.00	4.25
Metals,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	14.50	14.50	14.50	14.62½
Electrolytic copper, refinery	*14.00*	14.05	14.12½	14.12½
Zinc, St. Louis	*7.35*	7.45	7.42½	7.82½
Zinc, New York	*7.70*	7.80	7.77½	8.17½
Lead, St. Louis	*8.40*	8.50	8.65	9.25
Lead, New York	8.75	8.75	8.90	9.55
Tin (Straits), New York	**71.00**	69.87½	65.87½	59.12½
Antimony (Asiatic), N. Y.	*14.25*	15.50	16.00	17.25

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Pittsburgh

Foundry Iron Up 50c.—Furnace Coke Strong—Steel Output Holding

PITTSBURGH, Sept. 28.—A higher rate of ingot production in the Youngstown district counterbalances some slight recession here and there in the Pittsburgh district proper, and the general average of output in this and nearby districts holds at its recent rate of 85 per cent of capacity. Youngstown district production runs so heavily to sheets and pipe and order books in those products are so large that the prospect for a continued high operation in that territory is good. Pittsburgh, however, has more diversified production, running fairly heavily to plates, shapes and bars, and the outlook here is somewhat dimmed by the fact that there has not been the usual amount of contracting in these products for the final quarter of the year. It is probable that October production in these lines will hold up reasonably well on account of the firm attitude of manufacturers as to prices on fourth quarter tonnages which, in addition to the threatened cancellation of unspecified third quarter tonnages by the end of the month, has stimulated the release of shipping instructions.

Orders for steel from the automotive industry do not indicate any curtailment in October motor car production. Demand for steel from this source, however, will fall before there is a decided drop in automobile output, because usually 30 days and, in some instances, 60 days elapse between the shipment of the raw steel and its installation in the motor car as a fabricated part. In strips, for example, October specifications and orders would give a good idea of the automobile output expected in December.

Tin plate mills are operating at close to full physical capacity, but there are indications of the advancing of orders originally scheduled for later rolling. The American Sheet & Tin Plate Co. since a week ago has adopted the recent advance of $2 a ton in the common finishes of sheets by independent makers, and there are now only a few mills that are quoting less. The mills, however, have given buyers ample opportunity to place business at the former prices, and present obligations are estimated to be equal to the present rate of operations of around 90 per cent of capacity. Bookings by independent manufacturers this month have exceeded those of August by approximately 100,000 tons, and unfilled orders are sufficient to carry them through to the middle of December.

Makers of bars and shapes are insisting on 2c. as a minimum price for last quarter, but buyers seem disposed to give the market a full test before buying. A decision to confine purchases to monthly requirements would, of course, have a tendency to increase competition for business and make the situation more favorable to buyers.

Foundry and malleable grades of iron have advanced 50c. a ton since a week ago, not as result of materially increased demand, but because the strength of the coke market shows signs of permanence and has discouraged sales at recent prices, which would not yield a profit even for the producers with the lowest costs. It is difficult for Connellsville operators to increase coke production, because some of the union mines producing gas coal are resuming to take ad-

vantage of the export demand for that grade and, paying the union rate of wages, are drawing heavily from the labor supply of the Connellsville district.

Pig Iron.—Producers of foundry iron who recently might have taken business at $17.50, Valley furnace, for No. 2 grade, either have withdrawn from the market or have raised their prices 50c. a ton, and that grade now is not quotable at less than $18. Small-lot sales have been made at this price. There is no activity in basic iron, and the only worthwhile inquiry before the market is 2000 to 3000 tons recently asked for by the National Malleable & Steel Castings Co., Sharon, Pa. Small-lot sales of Bessemer iron continue to be made at $18.50 to $19, Valley furnace. The stack of the Struthers Furnace Co., Struthers, Ohio, recently was blown out for relining and repairs, leaving only five Valley merchant furnaces in blast, and it is understood that one of these will go out in the near future. The stack of the Stewart Furnace Co. will probably be blown in before long, but the potential supply situation is believed to be stronger than it was recently, and with the prospect that coke for last quarter will not be available at less than $3.50 per net ton at ovens, and possibly higher, it is not surprising to find producers taking a stronger price stand. At the same time, few subscribe to the idea that sharp advances are immediately ahead, because the peak of steel production seems to have been reached, and it is usually safe to count on the steel companies selling pig iron when the requirements for steel-making decrease.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh districts being $1.76 per gross ton:

Basic	$17.50 to $18.00
Bessemer	18.50 to 19.00
Gray forge	17.50 to 18.00
No. 2 foundry	18.00 to 18.50
No. 3 foundry	17.50 to 18.00
Malleable	18.00 to 18.50
Low phosphorus, copper free	27.50

Ferroalloys.—Outside of the fact that there is considerable pressure for shipments against contracts for the more commonly used ferroalloys, the situation is without feature. It is too early for negotiations for 1927 requirements, and important users are entirely covered against their needs in ferromanganese, spiegeleisen and ferrosilicon for this year. Prices are unchanged.

Semi-Finished Steel.—Formal contracts for fourth-quarter tonnages of billets, slabs and sheet bars are, if anything, less numerous than those for the third and second quarters. As is true in finished steel products, there is less tendency to contract for supplies of semi-finished steel by quarters than there was even as recently as a year ago. Consumers have their sources of supply well lined up, and the more common practice is to depend upon these sources and to order on a monthly basis. This has worked out well for both maker and buyer, for although it has not permitted much advance scheduling, it has brought supply and demand into more even balance, and with that has come remarkable price steadiness. Today's prices are the same as those ruling at the outset of the year. Prices are given on page 953.

Wire Products.—Demand for nails and wire is steady and well maintained. Mills in this district have made heavier shipments this month than in August, and present indications are that total shipments for the year will be well up to those of 1925, despite the fact that this year lacked the spring swell of shipments that marked last year. There is nice balance between production and shipments, and shipments measure consumption rather accurately, since stocks in second-hands are small. Prices are steady; they are given on page 951.

Rails and Track Supplies.—Makers of light rails rolled from billets are adhering firmly to $36, base, per gross ton, and sales are reported at that price. Most shipments, however, are on older orders, carrying prices of $33 and $34. A fairly good demand for small spikes is reported, but standard-section track accessories are rather dull. It is believed here that the Louisville & Nashville bolts, spikes and tie plates will go to Southern makers. Prices are given on page 951.

Tubular Goods.—There is no apparent let-down in the demand for oil country lap-welded and seamless pipe, and with a good deal of line pipe already booked and more in sight, there is no shortening of delivery promises. These, however, do not exceed four weeks in any size except possibly 2-in. line pipe. There is still considerable pressure for shipment of casing, and drill and drive pipe. Standard-weight pipe is moving steadily, but prompt deliveries are being made. It looks like sustained operation of lap-welded pipe-making units during the remainder of the year. Mill stocks are light, and occasion will be taken to rebuild them in the event of any tapering off later in the demand. Boiler tubes are selling steadily enough, but the market is not as broad as it was before electricity began to make inroads on steam for power purposes. Discounts are given on page 951.

Sheets.—The American Sheet & Tin Plate Co. late last week advanced its prices on the common finishes of sheets, and the quotations of manufacturers representing the major portion of the country's productive capacity now are 3.10c., base, Pittsburgh, for black, 3.95c., base, for galvanized and 2.40c., base, for blue annealed. The advance of $2 a ton also includes tin mill black plates, which now are quoted at 3.25c., base, (No. 28 gage), Pittsburgh. Long ternes remain at 4.65c., base, Pittsburgh. Evidently buyers are impressed by the latest advance, as orders have been rolling in freely at the former prices and most manufacturers now are fairly well sold for the remainder of the year. It will probably take that time to work out orders taken before and since the change in the base gages and gage differentials, and the test of the effectiveness of the latest advance has been pushed over to the first

THE IRON AGE Composite Prices

Finished Steel

Sept. 28, 1926, 2.439c. Per Lb.

One week ago	2.439c.
One month ago	2.431c.
One year ago	2.403c.
10-year pre-war average	1.689c.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets. These products constitute 87 per cent of the United States output of finished steel.

	High		Low	
1926	2.453c.,	Jan. 5;	2.403c.,	May 18
1925	2.560c.,	Jan. 6;	2.396c.,	Aug. 18
1924	2.789c.,	Jan. 15;	2.460c.,	Oct. 14
1923	2.824c.,	April 24;	2.446c.,	Jan. 2

Pig Iron

Sept. 28, 1926, $19.46 Per Gross Ton

One week ago	$19.46
One month ago	19.46
One year ago	19.63
10-year pre-war average	15.72

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	High		Low	
1926	$21.54,	Jan. 5;	$19.46,	July 13
1925	22.50,	Jan. 13;	18.96,	July 7
1924	22.88,	Feb. 26;	19.21,	Nov. 3
1923	30.86,	March 20;	20.77,	Nov. 20

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel

	Base Per Lb.
F.o.b. Pittsburgh mills	2.00c. to 2.10c.
F.o.b. Chicago	2.10c.
Del'd Philadelphia	2.32c.
Del'd New York	2.34c.
Del'd Cleveland	2.19c.
F.o.b. Birmingham	2.15c. to 2.25c.
C.i.f. Pacific ports	2.35c.
F.o.b. San Francisco mills	2.35c. to 2.40c.

Billet Steel Reinforcing

F.o.b. Pittsburgh mills	2.00c. to 2.10c.

Rail Steel

F.o.b. mill	1.80c. to 1.90c.
F.o.b. Chicago	2.00c.

Iron

Common iron, f.o.b. Chicago	2.00c.
Refined iron, f.o.b. P'gh mills	3.00c.
Common iron, del'd Philadelphia	2.22c.
Common iron, del'd New York	2.24c.

Tank Plates

	Base Per Lb.
F.o.b. Pittsburgh mill	1.90c.
F.o.b. Chicago	2.10c.
F.o.b. Birmingham	2.05c. to 2.15c.
Del'd Cleveland	2.09c.
Del'd Philadelphia	2.22c.
Del'd New York	2.24c.
C.i.f. Pacific ports	2.30c.

Structural Shapes

	Base Per Lb.
F.o.b. Pittsburgh mill	2.00c. to 2.10c.
F.o.b. Chicago	2.10c.
F.o.b. Birmingham	2.15c. to 2.25c.
Del'd Cleveland	2.19c.
Del'd Philadelphia	2.32c.
Del'd New York	2.34c.
C.i.f. Pacific ports	2.35c.

Hot-Rolled Flats (Hoops, Bands and Strips)

	Base Per Lb.
All gages, narrower than 6 in., P'gh	2.50c.
All gages, 6 in. and wider, P'gh	2.30c.
All gages, 6 in. and narrower, Chicago	2.60c.
All gages, wider than 6 in., Chicago	2.50c.
Cotton ties, f.o.b. Atlantic ports, per bundle of 45 lb.	$1.22
Cotton ties, f.o.b. Gulf ports, per bundle of 45 lb.	1.20

Cold-Finished Steel

	Base Per Lb.
Bars, f.o.b. Pittsburgh mills	2.40c. to 2.50c.
Bars, f.o.b. Chicago	2.50c.
Bars, Cleveland	2.55c.
Shafting, ground, f.o.b. mill	*2.70c. to 3.00c.
Strips, f.o.b. Pittsburgh mills	3.50c. to 3.60c.
Strips, f.o.b. Cleveland mills	3.25c. to 3.50c.
Strips, delivered Chicago	3.80c. to 3.90c.
Strips, f.o.b. Worcester mills	3.75c.

*According to size.

Wire Products

(To jobbers in car lots, f.o.b. Pittsburgh and Cleveland)

	Base per Keg
Wire nails	$2.65
Galv'd nails, 1-in. and longer	4.65
Galv'd nails, shorter than 1-in.	4.90
Galvanized staples	3.35
Polished staples	3.10
*Cement coated nails	2.65

*Subject to new card of extras dated Sept. 1, 1926.

	Base Per 100 Lb.
Bright plain wire, No. 9 gage	$2.50
Annealed fence wire	2.65
Spring wire	3.50
Galv'd wire, No. 9	3.10
Barbed wire, galv'd	3.35
Barbed wire, painted	3.10

Chicago district mill and delivered Chicago prices are $1 per ton above the foregoing. Birmingham mill prices $3 a ton higher; Worcester, Mass., mill $3 a ton higher on production of that plant; Duluth, Minn., mill $2 a ton higher; Anderson, Ind., $1 higher.

Woven Wire Fence

Base to Retailers Per Net Ton

F.o.b. Pittsburgh	$65.00
F.o.b. Cleveland	65.00
F.o.b. Anderson, Ind.	66.00
F.o.b. Chicago district mills	67.00
F.o.b. Duluth	68.00
F.o.b. Birmingham	68.00

Sheets

Blue Annealed

	Base Per Lb.
Nos. 9 and 10, f.o.b. Pittsburgh	2.30c. to 2.40c.
Nos. 9 and 10, f.o.b. Ch'go dist. mill	2.40c. to 2.50c.
Nos. 9 and 10, del'd Philadelphia	2.62c. to 2.72c.
Nos. 9 and 10, f.o.b. Birmingham	2.60c. to 2.65c.

Box Annealed, One Pass Cold Rolled

No. 24, f.o.b. Pittsburgh	3.00c. to 3.10c.
No. 24, f.o.b. Ch'go dist. mill	3.10c. to 3.20c.
No. 24, del'd Philadelphia	3.32c. to 3.42c.
No. 24, f.o.b. Birmingham	3.30c. to 340c.

Full Finished Sheets

No. 24, f.o.b. Pittsburgh, A grade	4.25c.
No. 24, f.o.b. Pittsburgh, B grade	4.10c.

Galvanized

No. 24, f.o.b. Pittsburgh	3.85c. to 3.95c.
No. 24, f.o.b. Chicago dist. mill	3.95c. to 4.05c.
No. 24, del'd Philadelphia	4.17c. to 4.32c.
No. 24, f.o.b. Birmingham	4.15c. to 4.25c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	3.15c. to 3.25c.
No. 28, f.o.b. Chicago dist. mill	3.25c. to 3.35c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh	4.25c.

Long Ternes

No. 28, 8-lb. coating, f.o.b. mill	4.65c.

Tin Plate

	Per Base Box
Standard cokes, f.o.b. P'gh district mills	$5.50
Standard cokes, f.o.b. Gary and Elwood, Ind.	5.60

Terne Plate

(*F.o.b. Morgantown or Pittsburgh*)

(Per package, 20 x 28 in.)

8-lb. coating, 100 lb. base	$11.40
8-lb. coating I.C.	11.70
15-lb. coating I.C.	14.85
20-lb. coating I.C.	$16.20
25-lb. coating I.C.	17.90
30-lb. coating I.C.	19.45
40-lb. coating I.C.	21.65

Alloy Steel Bars

(F.o.b. Pittsburgh or Chicago)

S. A. E. Series Numbers		Base Per 100 Lb.
2100*	(1½% Nickel, 0.10% to 0.20% Carbon)	$3.20 to $3.25
2300	(3½% Nickel)	4.40 to 4.50
2500	(5% Nickel)	5.50 to 5.65
3100	(Nickel Chromium)	3.40 to 3.50
3200	(Nickel Chromium)	5.00 to 5.25
3300	(Nickel Chromium)	7.00 to 7.25
3400	(Nickel Chromium)	6.25 to 6.50
5100	(Chromium Steel)	3.40 to 3.50
5200*	(Chromium Steel)	7.00 to 7.50
6100	(Chrom. Vanadium bars)	4.30
6100	(Chrom. Vanad. spring steel)	3.80
9250	(Silicon Manganese spring steel)	3.20 to 3.25
	Carbon Vanadium (0.45% to 0.55% Carbon, 0.15% Vanad.)	4.10 to 4.20
	Nickel Chrome Vanadium (0.60 Nickel, 0.50 Chrom., 0.15 Vanad.)	4.30
	Chromium Molybdenum bars (0.80—1.10 Chrom., 0.25—0.40 Molyb.)	4.25 to 4.35
	Chromium Molybdenum bars (0.50—0.70 Chrom., 0.15—0.25 Molyb.)	3.40 to 3.50
	Chromium Molybdenum spring steel (1—1.25 Chrom., 0.30—0.50 Molybdenum)	4.50 to 4.75

Above prices are for hot-rolled steel bars, forging quality. The ordinary differential for cold-drawn bars is 1c. per lb. higher. For billets 4 x 4 to 10 x 10 in. the price for a gross ton is the net price for bars of the same analysis. For billets under 4 x 4 in. down to and including 2½-in. squares, the price is $5 a gross ton above the 4 x 4 billet price.

*Not S. A. E. specifications, but numbered by manufacturers to conform to S. A. E. system.

Rails

	Per Gross Ton
Standard, f.o.b. mill	$43.00
Light (from billets), f.o.b. mill	36.00
Light (from rail steel), f.o.b. mill	32.00 to 34.00
Light (from billets), f.o.b. Ch'go mill	36.00 to 38.00

Track Equipment

(F.o.b. Mill)

	Base Per 100 Lb.
Spikes, ⅝ in. and larger	$2.80 to $3.00
Spikes, ½ in. and smaller	2.90 to 3.25
Spikes, boat and barge	3.25
Track bolts, all sizes	3.90 to 4.50
Tie plates, steel	2.25 to 2.35
Angle bars	2.75

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Steel: Inches	Black	Galv.	Iron: Inches	Black	Galv.
⅛	45	19½	¼ to ⅜	+11	+39
¼ to ⅜	51	25½	½	22	2
½	56	42½	¾	28	11
¾	60	48½	1 to 1½	30	12
1 to 3	62	50½			

Lap Weld

2	55	43½	2	23	7
2½ to 6	59	47½	2½	26	11
7 and 8	56	43½	3 to 6	28	13
9 and 10	54	41½	7 to 12	26	11
11 and 12	53	40½			

Butt Weld, extra strong, plain ends

⅛	41	24½	¼ to ⅜	+19	+54
¼ to ⅜	47	30½	½	21	7
½	53	42½	¾	28	12
¾	58	47½	1 to 1½	30	14
1 to 1½	60	49½			
2 to 3	61	50½			

Lap Weld, extra strong, plain ends

2	53	42½	2	23	9
2½ to 4	57	46½	2½ to 4	29	15
4½ to 6	56	45½	4½ to 6	28	14
7 to 8	52	39½	7 to 8	21	7
9 and 10	45	32½	9 to 12	16	2
11 and 12	44	31½			

To the large jobbing trade the above discounts on steel pipe are increased on black by one point, with supplementary discount of 5%, and on galvanized by 1½ points, with supplementary discount of 5%. On iron pipe, both black and galvanized, the above discounts are increased to large jobbers by one point with supplementary discounts of 5 and 2½%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Lap Welded Steel		Charcoal Iron	
2 to 2¼ in.	27	1½ in.	+18
2½ to 2¾ in.	37	1¾ to 1⅞ in.	+ 8
3 in.	40	2 to 2¼ in.	— 2
3¼ to 3¾ in.	42½	2½ to 3 in.	— 7
4 to 13 in.	46	3¼ to 4½ in.	— 9

Beyond the above discounts, 5 to 7 fives extra are given on lap welded steel tubes and 2 tens to 2 tens and 1 five on charcoal iron tubes.

Standard Commercial Seamless Boiler Tubes

Cold Drawn

1 in.	60	3 in.	45
1¼ to 1½ in.	52	3¼ to 3½ in.	47
1¾ in.	36	4 in.	50
2 to 2¼ in.	31	4½, 5 and 6 in.	45
2½ to 2¾ in.	39		

Hot Rolled

2 and 2¼ in.	34	3¼ and 3½ in.	50
2½ and 2¾ in.	42	4 in.	53
3 in.	48	4½, 5 and 6 in.	48

Less carloads, 4 points less. Add $8 per net ton for more than four gages heavier than standard. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage to be held at mechanical tube list and discount. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30%, base	55
Carbon, 0.30% to 0.40%, base	50

Plus differentials for lengths over 18 ft. and for commercially exact lengths. Warehouse discounts on small lots are less than the above.

quarter of next year. Mill operations are heavy, with the general average somewhat above 90 per cent of capacity. Prices are given on page 951.

Tin Plate.—There has been no material let-down in mill operations, but there is some evidence that maintenance of operating schedules is at the expense of business originally figured for November rolling. There was a rather abrupt ending in the demand for tin plate for packers' cans, and the container manufacturers now appear to have enough stock for their remaining requirements this year. Export orders are still a help to mill operations.

Cold-Finished Steel Bars and Shafting.—Business continues on a 30-day basis, but while makers cannot look very far ahead on production schedules, the orders keep coming along steadily and in sufficient volume to keep mill operations very even. Prices are steady at 2.50c., base Pittsburgh, for the general run of orders.

Warehouse Business.—The recent advance of $2 a ton in mill prices of black and galvanized sheets has been followed this week by a like advance in local warehouse prices. There seems to have been underpricing of warehouse quotations on galvanized sheets in the change of base gages, and adjustment has meant an advance of $4 a ton in the new price. There has been no change in warehouse prices of blue annealed sheets. The mill quotation has been advanced $2 a ton, but the recent price turns out to have been too high in relation with the former mill base.

Steel and Iron Bars.—Specifications on third quarter contracts have been fairly heavy in the past week in steel bars, but formal fourth quarter business still is light. The mills are not showing much anxiety to get contracts for the last quarter, while buyers confronted with paying an advance of $2 a ton over prices for third quarter tonnages are hesitant. Mills want 2c., base, Pittsburgh, from large-lot buyers and 2.10c. from those buying in small lots, but there are some willing to take moderate-size tonnages at 2c. and the heavy-tonnage buyers seem to think they are entitled to lower prices. Iron bars are steady but not very active.

Structural Material.—The effort of the mills is to establish a minimum of 2c. on large structural shapes for shipment over the remainder of the year, and they are unyielding in spite of the fact that the big-tonnage consumers seem to be balking at an advance of $2 a ton over the third quarter price. The market does not yet seem to be established fully at 2.10c. base, for small tonnages, and in this case, as with bars, large buyers feel entitled to a preferential price. A fair amount of business is coming to local fabricating shops.

Plates.—Mills in this district are adhering firmly to 1.90c., base, Pittsburgh, and that price is being quoted to large as well as small consumers. Plate mill engagement is not heavy, but makers feel they are entitled to a price that will yield a profit.

Hot-Rolled Flats.—September business in hot-rolled strips has averaged about 20 per cent greater than in August with makers here, and a fairly full engagement of mills for October is assured. Hoop and band business is steady but of moderate volume. There is no change in prices.

Cold-Rolled Strips.—September has been at least equal to August and, with some makers, somewhat larger in orders and specifications, but prices have not improved from the mill viewpoint. Small-lot buyers still are paying 3.50c. to 3.60c., base Pittsburgh, but on large tonnages the market still is quotable about $5 a ton below that range.

Bolts, Nuts and Rivets.—There has been some let-down in specifications for bolts and nuts, and production for October does not promise to be quite so heavy as it has been in the past few months. Prices are steady. Demand for rivets is steady rather than active.

Coke and Coal.—The market still shows marked strength in furnace coke. The coke for three blast furnaces for the final quarter of the year, amounting to approximately 25,000 tons a month, is before the market, and the larger producers are getting out no more coke than is required by their contract customers, while the effort of some ovens to increase production is defeated by shortage of labor. The fact that the British coal strike continues and that there is a continued good demand for gas coal for export has led to the starting up of some union mines producing that grade of coal. Since they pay the union rate of wages, men have been attracted away from the Connellsville district. There is some steel company demand for spot coke and also for coking coal. Prices of the latter have strengthened to a point that makes coal more profitable than coke. The supply of foundry coke is ample for the demand, and sales above $4.50 per net ton at ovens are rare. Prices are given on page 953.

Old Material.—There is no occasion to change prices except on the blast-furnace grades, for which the demand is extremely light, coming chiefly from dealers with short orders to cover. There was one sale of steel works scrap, amounting to 15,000 tons, representing the turnover of the year's stock of a Pittsburgh dealer. About one-third of the material was good heavy melting grade and the remainder miscellaneous scrap, all of which was sold at $17, delivered, to a Pittsburgh district steel company. The same company paid $17.50 for a lot of 5000 tons of good heavy melting steel, and that seems to be as low as that grade can be bought, while on strictly No. 1 steel $18 still is asked and none is available at less.

We quote for delivery to consumers' yards in the Pittsburgh and other districts taking the Pittsburgh freight rate as follows:

	Per Gross Ton	
Heavy melting steel	$17.50 to	$18.00
Scrap rails	17.00 to	17.50
No. 1 cast, cupola size	16.25 to	16.75
Compressed sheet steel	16 00 to	16.50
Bundled sheets, sides and ends	15.00 to	15.50
Railroad knuckles and couplers	19.00 to	19.50
Railroad coil and leaf springs	19.00 to	19.50
Low phosphorus blooms and billet ends	22.00 to	22.50
Low phosphorus mill plates	21.50 to	22.00
Low phosphorus, light grade	18.00 to	18.50
Low phosphorus punchings	19.00 to	19.50
Steel car axles	22.50 to	23.00
Cast iron wheels	16.50 to	17.00
Rolled steel wheels	19.00 to	19.50
Machine shop turnings	12.75 to	13.25
Short shoveling steel turnings	14.00 to	14.50
Sheet bar crops	18.00 to	19.00
Heavy steel axle turnings	15.50 to	16.00
Short mixed borings and turnings	12.75 to	13.25
Heavy breakable cast	16.00 to	16.50
Cast iron borings	12.75 to	13.25
No. 1 railroad wrought	13.50 to	14.00
No. 2 railroad wrought	17.50 to	18.00
Railroad or automobile malleable scrap	18.00 to	18.50

Warehouse Prices, f.o.b. Pittsburgh

	Base per Lb.
Tank plates	3.00c.
Structural shapes	3.00c.
Soft steel bars and small shapes	2.90c.
Reinforcing steel bars	2.90c.
Black sheets (No. 24 gage), 25 or more bundles	3.95c.
Galvanized sheets (No. 24 gage), 25 or more bundles	4.70c.
Blue annealed sheets (No. 10 gage), 25 or more sheets	3.40c.
Cold-finished shafting and screw stock—	
Rounds and hexagons	3.60c.
Squares and flats	4.10c.
Bands	3.60c.
Spikes, large	3.30c.
Small	3.80c. to 5.25c.
Boat	3.80c.
Bolts, track	4.90c.
Wire, black soft annealed, base per 100 lb.	$3.00
Wire, galvanized soft, base per 100 lb.	3.00
Common wire nails, per keg	3.00
Cement coated nails	3.05

Foundry Equipment Sales Gain

Sales in August reported by members of the Foundry Equipment Manufacturers' Association, Cleveland, showed a gain of 4 per cent over those of July and an increase of 19 per cent compared with August, 1925. The August total was $391,935, as against $378,163 for July and $328,995 for August, 1925. Shipments in August totaled $384,924, a decline of 14 per cent from the total of $448,390 reported in July and a recession of 6 per cent from the total of $412,057 for August, 1925. Orders on hand Sept. 1 totaled $422,148, a gain of 2½ per cent over the figure for Aug. 1.

Semi-Finished Steel, Raw Materials, Bolts and Rivets

Mill Prices of Semi-Finished Steel

F.o.b. Pittsburgh or Youngstown

Billets and Blooms

	Per Gross Ton
Rerolling, 4-in. and over	$35.00
Rerolling, under 4-in. to and including 1¾-in.	36.00
Forging, ordinary	40.00
Forging, guaranteed	45.00

Sheet Bars

	Per Gross Ton
Open-hearth or Bessemer	$36.00

Slabs

	Per Gross Ton
8 in. x 2 in. and larger	$35.00
Smaller than 8 in. x 2 in.	36.00

Skelp

	Per Lb.
Grooved	1.90c.
Sheared	1.90c.
Universal	1.90c.

Wire Rods

	Per Gross Ton
*Common soft, base	$45.00
Screw stock	$5.00 per ton over base
Carbon 0.20% to 0.40%	3.00 per ton over base
Carbon 0.41% to 0.55%	5.00 per ton over base
Carbon 0.56% to 0.75%	7.50 per ton over base
Carbon over 0.75%	10.00 per ton over base
Acid	15.00 per ton over base

*Chicago mill base is $46. Cleveland mill base, $45.

Prices of Raw Materials

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.50% iron	$4.55
Old range non-Bessemer, 51.50% iron	4.40
Mesabi Bessemer, 51.50% iron	4.40
Mesabi non-Bessemer, 51.50% iron	4.25
High phosphorus, 51.50% iron	4.15

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron ore, low phos., copper free, 55 to 58% iron in dry Spanish or Algerian	9.50c. to 10c.
Iron ore, Swedish, average 66% iron	9.50c.
Manganese ore, washed, 51% manganese, from the Caucasus	40c. to 42c.
Manganese ore, high grade, nominal	35c. to 44c.
Tungsten ore, high grade, per unit, in 60% concentrates	$11.75 to $12.50
	Per Ton
Chrome ore, Indian basic, 48% Cr_2O_3, crude, c.i.f. Atlantic seaboard	$22.50
	Per Lb.
Molybdenum ore, 85% concentrates of MoS_2, delivered	50c. to 55c.

Coke

	Per Net Ton	
Furnace, f.o.b. Connellsville prompt		$3.50
Foundry, f.o.b. Connellsville prompt	$4.50 to	5.00
Foundry, by-product, Ch'go ovens		9.75
Foundry, by-product, New England, del'd		12.00
Foundry, by-product, Newark or Jersey City, delivered	9.59 to	10.77
Foundry, Birmingham	5.50 to	6.00
Foundry, by-product, St. Louis or Granite City		10.00

Coal

	Per Net Ton	
Mine run steam coal, f.o.b. W. Pa. mines	$1.50 to	$2.00
Mine run coking coal, f.o.b. W. Pa. mines	1.85 to	2.00
Mine run gas coal, f.o.b. Pa. mines	2.10 to	2.20
Steam slack, f.o.b. W. Pa. mines	1.20 to	1.25
Gas slack, f.o.b. W. Pa. mines	1.35 to	1.50

Ferromanganese

	Per Gross Ton
Domestic, 80%, furnace or seab'd.	$88.00 to $95.00
Foreign, 80%, Atlantic or Gulf port, duty paid	88.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$32.00 to $34.00
Domestic, 16 to 19%	31.00 to 33.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50%	$85.00 to $87.50
75%	145.00 to 150.00

Per Gross Ton Furnace		*Per Gross Ton Furnace*	
10%	$35.00	12%	$39.00
11%	37.00	14 to 16%	$45 to 46.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
10%	$33.00	12%	$37.00
11%	35.00		

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
6%	$25.50	10%	$31.00
7%	26.50	11%	33.00
8%	27.50	12%	35.00
9%	29.00		

Other Ferroalloys

Ferrotungsten, per lb. contained metal, del'd	$1.05 to $1.10
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	11.50c.
Ferrovanadium, per lb. contained vanadium, f.o.b. furnace	$3.25 to $4.00
Ferrocarbontitanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	$200.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per net ton	$91.00
Ferrophosphorus, electric, 24%, f.o.b. Anniston, Ala., per net ton	$122.50

Fluxes and Refractories

Fluorspar

	Per Net Ton
Domestic, 85% and over calcium fluoride, not over 5% silica, gravel, f.o.b. Illinois and Kentucky mines	$17.00 to $18.00
No. 2 lump, Illinois and Kentucky mines	$20.00
Foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Atlantic port, duty paid,	$17.00 to $17.50
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silica, f.o.b. Illinois and Kentucky mines	$32.50

Fire Clay

	Per 1000 f.o.b. Works	
	High Duty	Moderate Duty
Pennsylvania	$40.00 to $43.00	$38.00 to $40.00
Maryland	43.00 to 46.00	38.00 to 40.00
New Jersey	55.00 to 75.00	
Ohio	40.00 to 43.00	38.00 to 40.00
Kentucky	40.00 to 43.00	38.00 to 40.00
Illinois	40.00 to 43.00	35.00 to 38.00
Missouri	40.00 to 43.00	35.00 to 38.00
Ground fire clay, per ton	6.50 to	7.50

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$43.00
Chicago	52.00
Birmingham	50.00
Silica clay, per ton	$8.00 to 9.00

Magnesite Brick

	Per Net Ton
Standard sizes, f.o.b. Baltimore and Chester, Pa.	$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00

Chrome Brick

	Per Net Ton
Standard size	$45.00 to $50.00

Mill Prices of Bolts, Nuts, Rivets and Set Screws

Bolts and Nuts

(Less-than-Carload Lots)

(F.o.b. Pittsburgh, Cleveland, Birmingham and Chicago)

	Per Cent Off List
Machine bolts, small, rolled threads	60 and 10
Machine bolts, all sizes, cut threads	50, 10 and 10
Carriage bolts, smaller and shorter, rolled threads	50, 10 and 10
Carriage bolts, cut threads, all sizes	50 and 10
Eagle carriage bolts	65 and 10
Lag bolts	60, 10 and 10
Plow bolts, Nos. 3 and 7 heads	50 and 10
(Extra of 20% for other style heads)	
Machine bolts, c.p.c. and t. nuts, ⅜ x 4 in.,	45, 10 and 5
Larger and longer sizes	45, 10 and 5
Bolt ends with hot-pressed nuts	50, 10 and 10
Bolt ends with cold-pressed nuts	45, 10 and 5
Hot-pressed nuts, blank and tapped, square,	4.00c. per lb. off list
Hot-pressed nuts, blank or tapped, hexagons,	4.40c. per lb. off list
C.p.c. and t. square or hex. nuts, blank or tapped	4.10c. per lb. off list
Washers*	6.50c. to 6.25c. per lb. off list

*F.o.b. Chicago and Pittsburgh.

The discount on machine, carriage and lag bolts is 5 per cent more than above for car lots. On hot-pressed and cold-punched nuts the discount is 25c. more per 100 lb. than quoted above for car lots.

Bolts and Nuts

(Quoted with actual freight allowed up to but not exceeding 50c. per 100 lb.)

	Per Cent Off List
Semi-finished hexagon nuts:	
⅜ in. and smaller, U. S. S.	80, 10 and 5
7/16 in. and larger, U. S. S.	75, 10 and 5
Small sizes, S. A. E.	80, 10, 10 and 5
S. A. E., ⅜ in. and larger	75, 10, 10 and 5
Stove bolts in packages	80, 10 and 5
Stove bolts in bulk	80, 10, 5 and 2½
Tire bolts	60 and 5

Semi-Finished Castellated and Slotted Nuts

(Actual freight allowed up to but not exceeding 50c. per 100 lb.)

(To jobbers and consumers in large quantities)

	Per 100 Net S.A.E.	U.S.S.		Per 100 Net S.A.E.	U.S.S.
¼-in.	$0.44	$0.44	⅝-in.	$2.35	$2.40
5/16-in.	0.515	0.515	⅞-in.	3.60	3.60
⅜-in.	0.62	0.66	1-in.	5.65	5.80
7/16-in.	0.79	0.90	1⅛-in.	8.90	8.90
½-in.	1.01	1.05	1¼-in.	12.60	13.10
9/16-in.	1.38	1.42	1⅜-in.	18.35	18.35
⅝-in.	1.70	1.73	1½-in.	21.00	21.00

Larger sizes.—Prices on application.

Large Rivets

	Base Per 100 Lb.
F.o.b. Pittsburgh	$2.50 to $2.60
F.o.b. Cleveland	2.70
F.o.b. Chicago	$2.60 to 2.75

Small Rivets

	Per Cent Off List
F.o.b. Pittsburgh	70 and 10
F.o.b. Cleveland	70, 10 and 5 to 70 and 10
F.o.b. Chicago	70, 10 and 5 to 70 and 10

Cap and Set Screws

(Freight allowed up to but not exceeding 50c. per 100 lb.)

	Per Cent Off List
Milled cap screws	80 and 10
Milled standard set screws, case hardened,	80 and 5
Milled headless set screws, cut thread	80
Upset hex. head cap screws, U. S. S. thread,	80, 10 and 10
Upset hex. cap screws, S.A.E. thread,	80, 10 and 10
Upset set screws	80, 10 and 5
Milled studs	70 and 5

Chicago

Heaviest Steel Bookings in Two Months —More Rail and Car Inquiries

CHICAGO, Sept. 28.—Railroad buying holds the center of the stage in the local steel market. The Chicago, Milwaukee & St. Paul has issued a formal inquiry for 1000 automobile and 500 stock cars. Demand for standard-section rails is heavy, and impending purchases by roads with Chicago terminals may total 650,000 tons. Local mills booked orders for more than 60,000 tons this week.

Structural activity is less marked than during the early part of the month, although the letting of one large project in Chicago brought the total for the week up to 10,000 tons. The demand for rail steel bars is unusually heavy, and Chicago makers are on double-turn operation. Billet steel bar specifications are well ahead of those for August. Deliveries of billet bars are extending, while in plates and shapes specifications are approximately equal to shipments. Business now being closed for the fourth quarter has brought sales for the week to the largest total since the seven-day period ending Aug. 5.

Pig Iron.—September sales of pig iron bulked large and compared favorably with the bookings of any one of the last 14 months. Shipments have been expanding gradually, and furnace stocks have been still further reduced. Fourth quarter contracting is about completed, but increasing interest is being shown in first quarter and first half iron. A Michigan user has closed for 4000 tons of malleable with a maker east of Chicago. This is for delivery through the first half of 1927. Another melter east of Chicago will take 5000 tons of malleable for delivery during the first six months of 1927. Buying is not large, but Northern foundry iron remains steady at $21, local furnace.

Quotations on Northern foundry, high phosphorus and malleable iron are f.o.b. local furnace, and do not include an average switching charge of 61c. per ton. Other prices are for iron delivered at consumers' yards:

Northern No. 2 foundry, sil. 1.75 to 2.25	$21.00
Northern No. 1 foundry, sil. 2.25 to 2.75	21.50
Malleable, not over 2.25 sil.	21.00
High phosphorus	21.00
Lake Superior charcoal, averaging sil. 1.50, delivered at Chicago	29.04
Southern No. 2 (all rail)	26.01
Southern No. 2 (barge and rail)	24.18
Low phos., sil. 1 to 2 per cent, copper free	$29.50 to 30.00
Silvery, sil. 8 per cent	32.29
Bessemer ferrosilicon, 14 to 15 per cent	45.79

Ferroalloys.—There is little demand in the local market for ferromanganese. Dealers are quoting $95, seaboard, but reports indicate that $88 can be done in small lots when sellers are satisfied that the material is for immediate requirements and is not to be stocked. Several users are reported as having taken small tonnages for delivery in the fourth quarter at $95, seaboard. The spot market for 50 per cent ferrosilicon is quiet, since users are well covered by contracts against which specifications are in good volume.

We quote 80 per cent ferromanganese, $95.56, delivered Chicago; 50 per cent ferrosilicon, $85, delivered; spiegeleisen, 18 to 22 per cent, $41.56, delivered Chicago.

Sheets.—All producers have met the $2 a ton advance made last week by the Inland Steel Co. Quotations at Chicago mills are now 3.20c. for black, 2.50c. for blue annealed and 4.05c. for galvanized sheets. Specifications are in good volume, and mill schedules are full. Average deliveries are not better than five weeks.

Chicago delivered prices from mill are 3.15c. to 3.25c. for No. 24 black; 2.45c. to 2.55c. for No. 10 blue annealed; 4c. to 4.10c. for No. 24 galvanized. Delivered prices at other Western points are equal to the freight from Gary plus the mill prices, which are 5c. per 100 lb. lower than the Chicago delivered prices.

Plates.—Reports of impending activity in the railroad equipment market are persistent, and it is estimated that 15,000 cars will soon be up for figures. Formal inquiries have not yet been put out by the Chicago and North Western, but it is believed that orders will be placed at an early date and will closely follow the request for figures. If reports are accurate, the Illinois Central will soon be in the market for about 8000 cars, many of which will be coal cars calling for a large tonnage of steel. The Chicago, Milwaukee & St. Paul is inquiring for 1000 automobile and 500 stock cars. The Missouri Pacific is expected to enter the market for 3500 miscellaneous freight cars. The Pacific Fruit Express Co. is asking for figures on 500 underframes, and this, together with other actual inquiries, will require about 25,000 tons of plates, shapes and bars. The plate market is gaining strength under the influence of an active demand from many sources. Fresh inquiry for oil tank steel totals 10,000 tons, which is in addition to the 6000 tons asked for last week and not yet closed. The bulk of this tonnage is for the oil fields of the Southwest.

The mill quotation on plates is 2.10c. per lb., base, Chicago.

Structural Material.—The outstanding award of the week is the Pittsfield Building, Chicago, requiring over 8000 tons. On the whole, building activity has declined in the past month, although fabricators' estimating departments are busy. The approach of the winter months has some bearing on the present situation, but there also seems to be more difficulty in financing projects, which some attribute to unsettled labor conditions. Shops at the moment are well supplied with work, but with only six weeks' to two months' orders on their books they are pressing for more tonnage, often at the expense of the prices obtained. A contract was placed this week for 1025 tons for extensions to the White Sox base ball park, Chicago, and a local apartment building will call for 1400 tons. Action on proposed additions to the Crane Co. plant, Chicago, requiring 1200 tons, has been postponed.

The mill quotation on plain material is 2.10c. per lb. base, Chicago.

Bars.—Mild steel bar specifications for the first three weeks of September were 40 per cent ahead of those for the corresponding period of August. Orders from the automobile trade indicate that motor car production remains at a high level. Specifications from makers of farm implements are in good volume, but destructive floods and an early frost have clouded the outlook for that industry. Corn growers have been the heaviest losers, and it is from them that a large share of the fall farm machinery business emanates. Demand for alloy steel bars is steady, with prices unchanged. Iron bars are in fair demand, with both new buying and specifications showing a decided improvement over the previous week. Orders from the railroads are particularly liberal. The ruling market on bar iron is unchanged at 2c., Chicago. The growth in the use of rail steel bars is shown by the fact that the Calumet Steel Co. is now operating double turn. Makers are sold practically to the first of the year, and deliveries which match rolling schedules are not better than three to four weeks. The demand for reinforcing bars is heavy, and sizable specifications are being received from the makers of barn equipment. Mill stocks of fence posts are well balanced but are not increasing. Post shipments are larger than a year ago.

Mill prices per lb. are: Mild steel bars, 2.10c., base, Chicago; common bar iron, 2c., base, Chicago; rail steel bars, 2c., base, Chicago.

Wire Products.—Although fair, demand for barbed wire and fencing is not up to the expectations of makers. Nails are moving steadily, with prices firmer than during the summer months. Business emanating from the jobbing trade is steady, but makers had expected that by this time it would have increased. Specifications, no doubt, have been adversely affected by the damage to crops from floods and early frost. The corn crop in most of the Central States has not matured,

and the loss due to high water along the river bottoms is reported as large. In the far South the cotton crop appears improved, but in other sections of the cotton belt estimates show only about 65 per cent of the 1925 yield. Specifications from the manufacturing trade are being received at a steady rate, and no hesitancy is being shown in signing fourth quarter contracts. Mill prices are shown on page 951.

Rails and Track Supplies.—Early estimates of the fall rail buying movement appear to have been too low, and it now looks as though inquiry by railroads having terminals in Chicago will exceed 650,000 tons. The largest single inquiry is that of the New York Central Lines, which calls for 240,000 tons of standard-section rails. Miscellaneous orders booked in the past week by Chicago mills total 70,000 tons. Rail mills are operating at a low rate, and it is unlikely that they will get under way on specifications against new contracts before late October. Orders for track fastenings are light, and the only inquiry of note is one from a Western railroad for 5000 tons of steel tie plates. Estimates of the rail requirements of various railroads are as follows: Santa Fe, 135,000 tons; Illinois Central, 80,000 tons; Rock Island, 45,000 tons; Chicago, Milwaukee & St. Paul, 50,000 tons; Burlington, 42,000 tons; Chicago & North Western, 35,000 tons, and the Chicago & Alton, 6000 tons.

Standard Bessemer and open-hearth rails, $43; light rails, rolled from billets, $36 to $38 per gross ton, f.o.b. maker's mill.

Standard railroad spikes, 2.90c. per lb. mill; track bolts with square nuts, 3.90c. mill; steel tie plates, 2.35c. mill; angle bars, 2.75c. mill.

Billets.—The week was active in this commodity, and new bookings total 5000 tons. Small rerolling billets are steady at $36 per gross ton, Chicago.

Coke.—Foundry melt, as reflected by shipments of coke, is steady, and local ovens are operating at practical capacity. By-product foundry coke is quoted at $9.75, ovens, and $10.25, delivered in the Chicago switching district.

Sheet Bars.—The market is steady at $36 per gross ton, Chicago, and mill bookings this week were in excess of 1000 tons.

Fluorspar.—Fluorspar is not in great demand, and Middle West consumers have taken only a few small lots at $18, mines.

Bolts, Nuts and Rivets.—The recent advance in the price of stove bolts has not held, and quotations now are 80, 10 and 5 off list in packages and 80, 10, 5 and 2½ off list in bulk. Contracting for the fourth quarter is well advanced, and prices other than for stove bolts are steady. Specifications are gradually growing, and this week the railroads have sent in large orders.

Reinforcing Bars.—Awards are more numerous, but they are individually small and in the aggregate fall short of shop capacity in this district. As a result benders' backlogs are shrinking, as contractors specify heavily in an effort to get construction programs well advanced before cold weather sets in. Fresh inquiry in large tonnages is slow in coming out, although projects taking from 10 to 50 tons each are fairly numerous. Bar shops have not as yet reduced forces but may be forced to do so soon, owing to the failure of many long pending jobs to mature. Competition for going tonnage is keen, and prices show no more strength than a week ago. Quotations on billet steel reinforcing bars range from 2.25c. to 2.60c., local warehouse. New inquiries and projects recently awarded are shown on page 964.

Cast Iron Pipe.—The market is active, and the price situation is unchanged. The National Cast Iron Pipe Co. has taken 1400 tons of 6, 8, 10 and 12-in. pipe for Wilmette, Ill. The Glamorgan Pipe & Foundry Co. was low bidder on 150 tons of 6 and 12-in. Class B pipe for Oak Park, Ill., and the Lynchburg Foundry Co. has taken 260 tons of 8-in. and 175 tons of 6-in. Class B pipe for Royal Oak, Mich. The general contract for 4200 tons of 6 to 30-in. Class B and C pipe for Wyandotte, Mich., was awarded to Coleman & Harding. Six hundred tons of 6, 8 and 12-in. pipe for Cuyahoga Falls, Ohio, was taken by the Lynchburg Foundry Co. Chicago will close Oct. 1 on 448 tons of 16-in. Class B and on Oct. 7 on 80 tons of 8-in. and 500 tons of 12-in. Milwaukee took bids Sept. 27 on 150 tons of 6-in., 100 tons of 8-in. and 775 tons of 16-in. Class C.

We quote per net ton, delivered, Chicago, as follows: Water pipe, 4-in., $51.20 to $53.20; 6-in. and over, $47.20 to $49.20; Class A and Gas pipe, $4 extra.

Old Material.—The supply of scrap in this district is more than adequate for consumptive demands, and prices are easier. Railroad and factory scrap are coming out freely, and much of it is readily placed but at prices largely dictated by the buyer. The insistence of a large user on shipments of heavy melting steel from the railroads has left a large surplus of a second grade steel. A mill this week has taken 5000 tons of heavy melting steel at $14, and dealers now find that they cannot place more at that figure. Cast iron borings are particularly weak, following the report that the largest user in this district will no longer buy that grade. A merchant furnace has recently taken over 15,000 tons of that grade and is now out of the market for the remainder of the year. Railroad lists this week include offerings of 4200 tons by the Big Four, 2000 tons by the Chicago Great Western and a blank list from the Michigan Central.

We quote delivered in consumers' yards, Chicago and vicinity, all freight and transfer charges paid for all items, except relaying rails, including angle bars to match, which are quoted f.o.b. dealers' yards:

	Per Gross Ton	
Heavy melting steel	$13.50 to	$14.00
Frogs, switches and guards, cut apart, and miscellaneous rails	15.50 to	16.00
Shoveling steel	13.25 to	13.75
Hydraulic compressed sheets	12.00 to	12.50
Drop forge flashings	9.00 to	9.50
Forged cast and rolled steel carwheels	17.50 to	18.00
Railroad tires, charging box size	18.25 to	18.75
Railroad leaf springs, cut apart	18.00 to	18.50
Steel couplers and knuckles	17.25 to	17.75
Coil springs	18.50 to	19.00
Low phosphorus punchings	17.00 to	17.50
Axle turnings, foundry grade	13.75 to	14.25
Axle turnings, blast fur. grade	10.50 to	11.00
Relaying rails, 56 to 60 lb.	25.50 to	26.50
Relaying rails, 65 lb. and heavier	26.00 to	31.00
Rerolling rails	17.00 to	17.50
Steel rails, less than 3 ft.	17.00 to	17.50
Iron rails	14.50 to	15.00
Cast iron borings	10.50 to	11.00
Short shoveling turnings	10.50 to	11.00
Machine shop turnings	7.25 to	7.75
Railroad malleable	17.00 to	17.50
Agricultural malleable	15.00 to	15.50
Angle bars, steel	16.00 to	16.50
Cast iron carwheels	15.25 to	15.75
	Per Net Ton	
No. 1 machinery cast	16.50 to	17.00
No. 1 railroad cast	15.75 to	16.25
No. 1 agricultural cast	15.50 to	16.00
Stove plate	14.50 to	15.00
Grate bars	14.00 to	14.50
Pipe shoes	13.50 to	14.00
Iron angle and splice bars	14.00 to	14.50
Iron arch bars and transoms	20.00 to	20.50
Iron car axles	23.00 to	23.50
Steel car axles	17.50 to	18.00
No. 1 railroad wrought	13.50 to	14.00
No. 2 railroad wrought	12.50 to	13.00
No. 1 busheling	10.50 to	11.00
No. 2 busheling	7.00 to	7.50
Locomotive tires, smooth	17.00 to	17.50
Pipes and flues	10.00 to	10.50

Warehouse Prices, f.o.b. Chicago

	Base per Lb.
Plates and structural shapes	3.10c.
Mild steel bars	3.00c.
Reinforcing bars, billet steel	2.25c. to 2.60c.
Cold-finished steel bars and shafting—	
Rounds and hexagons	3.60c.
Flats and squares	4.10c.
Hoops	4.15c.
Bands	3.65c.
No. 24 black sheets	3.95c.
No. 10 blue annealed sheets	3.50c.
No. 24 galvanized sheets	4.80c.
Standard railroad spikes	3.55c.
Track bolts	4.55c.
Structural rivets	3.50c.
Boiler rivets	3.70c.
	Per Cent Off List
Machine bolts	50 and 5
Carriage bolts	47½
Coach or lag screws	55 and 5
Hot-pressed nuts, square, tapped or blank	3.25c. off per lb.
Hot-pressed nuts, hexagons, tapped or blank	3.75c. off per lb.
No. 8 black annealed wire, per 100 lb.	$3.30
Common wire nails, base, per keg	3.05
Cement coated nails, base, per keg	3.05

Philadelphia

Advance in Price of Foundry Pig Iron Likely—Steel Demand Continues Steady

PHILADELPHIA, Sept. 28.—Steel business already on mill books indicates that there will be no material let-down in operations over the remainder of the year. September bookings by local steel sales offices have been fully up to the record set by July and August, and in some cases the total will run ahead of either of those months. Bids close Wednesday, Sept. 29, on the fourth quarter steel requirements of the Pennsylvania Railroad, totaling about 22,200 tons. Steel buying is still characterized by the large number of small and medium-sized orders. Some of the sheet mills are booked full to the end of the year.

Before the week is out all of the eastern Pennsylvania district furnaces will probably be quoting prices 50c. above those now in effect. One furnace advanced its price on pig iron a week or so ago, and the others are expected to follow.

Scrap iron and steel are weaker. The district has been flooded the past week with inferior grades of heavy melting steel which had been rejected by one mill as unsuitable for its requirements. A sale of heavy melting steel has been made at $16.50, a decline of 50c. a ton.

Ferroalloys.—There is no change in the situation as to ferromanganese. Domestic furnaces quote $88 to $95, and the imported alloy is still too high in price, namely $100, to be a factor.

Billets.—Sales of a few hundred tons of billets have been made within the week. Some mills continue to ask $35, Pittsburgh, for rerolling quality and $40, base, for forging billets, but occasionally these prices are slightly shaded.

Plates.—Orders for plates are mostly small, but there is a fairly steady flow of them. Eastern plate mills continue to operate at 60 per cent or better and are able to make earlier deliveries than is possible in most other rolled steel products. Many plate consumers have returned to the practice of making quarterly contracts, and some mills have signed up a good deal of tentative tonnage for fourth quarter. Quotations remain uniform and firm at 1.90c., Pittsburgh.

Pig Iron.—An advance of 50c. a ton on foundry pig iron may become generally effective within a week. One furnace made such an advance over a week ago, and the other active furnaces of the district are expected to take the same firmer stand on prices. This will put foundry iron on the basis of $21.50, furnace, for No. 2 plain, $22 for No. 2X and $22.50 for No. 1X. Furnaces of this district are well booked for fourth quarter, one or two having scarcely enough unsold iron to take care of regular customers that have not yet bought their full requirements. A few consumers have been feeling out the market for first quarter and apparently are willing to buy for that period, but the furnaces are holding off until they know more about coke costs, there being an expectation that fall and winter demand for domestic heating coke may force prices higher on metallurgical grades. The pig iron situation is tightening also with respect to imports. European furnaces are able to get better prices in their home markets and hence are less anxious to sell here except to such extent as is necessary to hold the trade they have built up. Some Dutch iron has been sold for first quarter, but possibly less will be available than has recently been coming. Fifteen hundred tons of foundry iron sold by the Mystic furnace at Everett, Mass., to a Philadelphia district consumer will be moved by barge. The New England Coal & Coke Co., which owns the Mystic furnace, receives Pocahontas coal for its coke plant by sea-going barges, and the fact that these barges usually return unladen makes it possible to ship iron from Everett to tidewater points in this district at a very low freight rate. Just how much of the New England iron will come to this district is uncertain and will depend upon the need of the Mystic furnace for business. The Baldwin Locomotive Works is reported to have bought the "floor iron" for which it recently inquired and also a tonnage of low phosphorus iron for its Standard Steel Works Co. plant. The Central Foundry Co. is in the market for 2200 tons of foundry grades for its plants at Lansdale, Pa., and Dundalk, Md. Copper free low phosphorus iron is somewhat scarce in the East owing to the recent blowing out of the Standish furnace.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia and include freight rates varying from 76c. to $1.63 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	$21.76 to $22.26
East. Pa. No. 2X, 2.25 to 2.75 sil.	22.26 to 22.76
East. Pa. No. 1X	22.76 to 23.26
Virginia No. 2 plain, 1.75 to 2.25 sil.	27.67 to 28.67
Virginia No. 2X, 2.25 to 2.75 sil.	28.17 to 29.17
Basic delivered eastern Pa.	20.75 to 21.50
Gray forge	21.00 to 22.00
Malleable	22.00 to 22.50
Standard low phos. (f.o.b. furnace)	22.00 to 23.00
Copper bearing low phos. (f.o.b. furnace)	23.50 to 24.00

Structural Shapes.—Building work is going on at a good pace, and the specifications coming to the mills for plain material are in large volume. Rolling schedules are fairly well filled, and it is not easy for buyers to obtain deliveries, except for small orders that may be shipped from stock, in less than two or three weeks, and sometimes longer is required. Mills are getting 2.10c., Pittsburgh, on some of the small, quick-shipment orders. On other business 2c., Pittsburgh, is the prevailing quotation, although less than this has been done on large projects.

Bars.—Consumers have specified liberally against expiring third quarter contracts. This includes some business that was taken at 1.90c., Pittsburgh. It is stated that 1.90c. business has now been fully specified and bars will soon be on a 2c. basis even with respect to shipments. For fourth quarter mills are quoting 2c. There are no reports of deviation from this price in this district. Bar iron makers continue to quote 2.22c., Philadelphia, for merchant bars.

Sheets.—There has been large buying of blue annealed sheets anticipating an advance to 2.40c., Pittsburgh, which has now been put into effect by many of the mills. Regular customers were given an opportunity to contract for fourth quarter at 2.30c. On black and galvanized sheets the price situation is also stronger in that most of the mills now quote 3.10c., Pittsburgh, as a minimum on black sheets, and 3.90c. to 4c. on galvanized. Not much new business is being entered at the higher levels because of the large buying preceding the advances. Some mills are quite solidly booked for fourth quarter, and for the first time in many months a few mills are turning away business that is too exacting in its requirements or which does not emanate from regular trade.

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Tank steel plates, ¾-in. and heavier	2.80c. to 3.00c.
Tank steel plates, ⅜-in.	3.00c.
Structural shapes	2.75c. to 2.90c.
Soft steel bars, small shapes and iron bars (except bands)	3.00c.
Round-edge iron	3.50c.
Round-edge steel, iron finished, 1½ x 1½ in.	3.50c.
Round-edge steel, planished	4.30c.
Reinforcing steel bars, square, twisted and deformed	3.00c.
Cold-finished steel, rounds and hexagons	4.00c.
Cold-finished steel, squares and flats	4.50c.
Steel hoops	4.00c. to 4.25c.
Steel bands, No. 12 gage to ⅛-in., inclusive	3.75c. to 3.90c.
Spring steel	5.00c.
No. 24 black sheets	4.25c.
No. 10 blue annealed sheets	3.40c.
No. 24 galvanized sheets	5.20c.
Diamond pattern floor plates—	
¼-in.	5.30c.
⅜-in.	5.50c.
Rails	3.20c.
Tool steel	8.50c.
Swedish iron bars	6.00c. to 6.50c.

Warehouse Business.—The local warehouse situation continues somewhat upset by competition of foreign steel. Business is only fair.

Imports.—Last week's imports of pig iron were larger than in some weeks, totaling 5025 tons, of which 2775 tons came from Germany and 2250 tons from India. Other imports were as follows: Iron ore from Algeria, 12,621 tons; chrome ore from Portuguese Africa, 3000 tons; structural steel from Germany, 43 tons; steel bars from the Netherlands, 18 tons; steel billets from Sweden, 37 tons; steel ingots from Sweden, 6 tons; steel blooms from France, 722 tons.

Old Material.—Wholesale rejections of alleged inferior grades of heavy melting steel have been made within the past week by the Bethlehem Steel Co., Bethlehem, Pa., which has inaugurated more rigid inspection methods and has made changes in its inspection crew. It is reported that fully 300 cars of the rejected scrap have been shipped from one mill to another and in some cases have been rejected by other mills. It has been the policy of the Bethlehem plant to take in various grades of melting steel at reductions in price from the price offered for strictly No. 1 melting steel, but this is said to have led to abuses which the Bethlehem company now purposes to eradicate. There will be no change in the Bethlehem policy of accepting miscellaneous grades of scrap, but more rigid inspection will be given each car and notice to that effect has reached the scrap trade. The tone of the scrap market has been weak, and there have been further price declines on some grades. A sale of heavy melting steel at $16.50 to a large consumer brings the price range of that grade to $16.50 to $17. The higher price is still to be had from one or two mills and is the minimum at which brokers would be willing to sell to mills having the higher freight rates from usual shipping points.

We quote for delivery, consuming points in this district, as follows:

No. 1 heavy melting steel	$16.50 to $17.00
Scrap rails	16.50 to 17.00
Steel rails for rolling	$17.50 to 18.00
No. 1 low phos., heavy, 0.04 per cent and under	21.00 to 22.00
Couplers and knuckles	18.50 to 19.00
Rolled steel wheels	18.50 to 19.00
Cast iron carwheels	17.50 to 18.00
No. 1 railroad wrought	17.50 to 18.00
No. 1 forge fire	14.50
Bundled sheets (for steel works)	13.50
Mixed borings and turnings (for blast furnace)	12.50 to 13.50
Machine shop turnings (for steel works)	13.50
Machine shop turnings (for rolling mill)	13.50 to 14.00
Heavy axle turnings (or equivalent)	14.50 to 15.00
Cast borings (for steel works and rolling mill)	13.50 to 14.00
Cast borings (for chemical plant)	16.50
No. 1 cast	17.50 to 18.00
Heavy breakable cast (for steel works)	16.50 to 17.00
Railroad grate bars	14.00
Stove plate (for steel works)	14.00
Wrought iron and soft steel pipes and tubes (new specifications)	15.00 to 15.50
Shafting	21.00 to 22.00
Steel axles	23.00 to 24.00

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and structural shapes	3.34c.
Soft steel bars and small shapes	3.24c.
Iron bars	3.24c.
Iron bars, Swedish charcoal	7.00c. to 7.25c.
Cold-finished steel shafting and screw stock—	
Rounds and hexagons	4.00c.
Flats and squares	4.50c.
Cold-rolled strip, soft and quarter hard	6.25c.
Hoops	4.49c.
Bands	3.99c.
Blue annealed sheets (No. 10 gage)	3.89c.
Long terne sheets (No. 28 gage)	6.35c.
Standard tool steel	12.00c.
Wire, black annealed	4.50c.
Wire, galvanized annealed	5.15c.
Tire steel, 1½ x ½ in. and larger	3.30c.
Smooth finish, 1 to 2½ x ¼ in. and larger	3.65c.
Open-hearth spring steel, bases	4.50c. to 7.00c.

	Per Cent Off List
Machine bolts, cut thread	40 and 10
Carriage bolts, cut thread	30 and 10
Coach screws	40 and 10

Boiler Tubes—	Per 100 Ft.
Lap welded steel, 2-in.	$17.33
Seamless steel, 2-in.	20.24
Charcoal iron, 2-in.	25.00
Charcoal iron, 4-in.	67.00

Discounts on Welded Pipe

Standard Steel—	Black	Galv.
⅛-in. butt	46	29
¼-in. butt	51	37
⅜-in. butt	53	39
2½-6-in. lap	48	35
7 and 8-in. lap	44	17
11 and 12-in. lap	37	12
Wrought Iron—		
⅛-in. butt	4	+19
¼-in. butt	11	+ 9
1-1½-in. butt	14	+ 6
2-in. lap	5	+14
3-6-in. lap	11	+ 6
7-12-in. lap	3	+16

Tin Plate (14 *x* 20 *in.*)

	Prime	Seconds
Coke, 100 lb. base box	$6.45	$6.20
Charcoal, per box—	A	AAA
IC	$9.70	$12.10
IX	12.00	14.25
IXX	13.90	16.00

Terne Plate (14 *x* 20 *in.*)

IC—20-lb. coating	$10.00 to $11.00
IC—30-lb. coating	12.00 to 13.00
IC—40-lb. coating	13.75 to 14.25

Sheets, Box Annealed—Black, C. R. One Pass

	Per Lb.
Nos. 18 to 20	4.15c.
No. 22	4.30c.
No. 24	4.35c.
No. 26	4.45c.
No. 28*	4.60c.
No. 30	4.85c.

Sheets, Galvanized

	Per Lb.
No. 14	4.50c. to 4.75c.
No. 16	4.60c. to 4.85c.
No. 18	4.75c.
No. 20	4.90c.
No. 22	4.95c.
No. 24	5.10c.
No. 26	5.35c.
No. 28*	5.60c.
No. 30	6.00c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

New York

Pig Iron Sales Gain—September on Par with August in Steel Bookings

NEW YORK, Sept. 28.—Pig iron sales in this district during the past week totaled about 15,000 tons. It is estimated that total bookings for the month exceeded those of August by 40 or 50 per cent. A number of the larger buyers have come into the market recently. Recent purchases of basic iron by the American Tube & Stamping Co., Bridgeport, Conn., totaled about 8000 tons, which was divided among three New York State furnaces. The United States Cast Iron Pipe & Foundry Co., Burlington, N. J., has closed for 3000 tons of eastern Pennsylvania iron. Two pending inquiries from New Jersey melters total 2000 tons and 1000 tons respectively. On the whole, new inquiry is in smaller volume, but this is undoubtedly accounted for by the foundry convention at Detroit, which has drawn many purchasing agents away from their desks. The Port Henry, N. Y., furnace, which blew out last week, will go in again as soon as necessary repairs can be made. The removal of this stack from the active list, however, has been balanced by the blowing in yesterday of the new Mystic stack at Everett, Mass. The Colonial stack, Riddlesburg, Pa., is expected to go out soon. The increasing strength of the coke market accounts for the firmer attitude of furnaces on prices and the greater willingness of melters to buy.

We quote per gross ton delivered in the New York district as follows, having added to furnace prices $2.52 freight from eastern Pennsylvania, $4.91 from Buffalo and $5.54 from Virginia:

East Pa. No. 2 fdy., sil. 1.75 to 2.25	$21.89 to $23.02
East Pa. No. 2X fdy., sil. 2.25 to 2.75	22.39 to 23.52
East Pa. No. 1X fdy., sil. 2.75 to 3.25	22.89 to 24.02
Buffalo fdy., sil. 1.75 to 2.25 (all rail)	22.91 to 23.91
No. 2 plain fdy., sil. 1.75 to 2.25 (by barge, del'd alongside in lighterage limits, N. Y. and Brooklyn)	20.00 to 21.00
No. 2 Virginia fdy., sil. 1.75 to 2.25	27.54 to 28.04

Finished Steel.—Steel requirements for the remainder of the year are now fairly well gaged except so

far as the railroads are concerned. Reports of probable large purchases by the carriers of cars, locomotives and rails have as yet received little substantiation in the form of tangible inquiries. However, a rail-buying program is fairly well assured, but of what proportions remains to be seen. As to cars and locomotives, there is a slight gain in activity in that several roads are known to be about to enter the market for round lots of cars and possibly some locomotives. The Louisville & Nashville has authorized the purchase of 1500 freight cars, 28 passenger cars and 18 locomotives. Local sales offices of steel companies report that orders received in September were fully equal to, and in some cases ahead of, August bookings. Fourth quarter contracts generally duplicate the amount of steel that was used in the third quarter. Prices of bars and shapes appear to be firm at 2c., Pittsburgh, while plates remain strongly intrenched at 1.90c., despite the fact that plate orders during the past month or so have not been on a par with the months just preceding. Nearly all sheet manufacturers are booked through October and November, and some have orders that will keep their mills fully engaged until the end of the year. There has been heavy buying of blue annealed sheets in the past two weeks anticipating an advance to 2.40c., Pittsburgh, which nearly all makers have put into effect. Practically all of the recent orders, however, were placed at 2.30c. Quotations on black sheets are almost uniform at 3.10c., Pittsburgh, while on galvanized sheets both 3.95c. and 4c. are named. Cold-rolled strip steel continues weak, with sales at 3.25c., Pittsburgh, and even at a shade less than this figure. Cold-drawn steel has been sold at 2.40c., Pittsburgh, although some makers still adhere to 2.50c. Large sizes of pipe are hard to obtain for early delivery, but the smaller sizes can be shipped with fair promptness. Local pipe jobbers frequently cut prices on pipe out of stock. Structural steel awards are falling below the August rate in the New York district. The largest letting of the past week was 3000 tons for a Park Avenue hotel. Structural awards in August reported to the Structural Steel Board of Trade of New York totaled 30,515 tons for the metropolitan district, compared with 41,114 tons in July. For the first eight months of 1926 lettings recorded by the board totaled 256,905 tons.

We quote for mill shipments, New York delivery, as follows: Soft steel bars, 2.34c. per lb.; plates, 2.24c.; structural shapes, 2.34c.; bar iron, 2.24c.

Cast Iron Pipe.—Purchasing of small lots continues in moderate volume, but buying by municipalities is still small. Salem, Mass., is reported to have placed 5000 tons of pipe with the Warren Foundry & Pipe Co. Among current inquiries for cast iron water and gas pipe is a total of 16,000 tons, included in a large contract on which the city of San Domingo in the Dominican Republic will open bids Oct. 1. A Birmingham producer of pipe recently booked about 700 tons of pipe for shipment to Mexico. The award of the 10,000 tons of pipe for the City of New York is still delayed.

We quote pressure pipe per net ton, f.o.b. New York in carload lots, as follows: 6-in. and larger, $49.60 to $52.60; 4-in. and 5-in., $54.60 to $57.60; 3-in., $64.60 to $67.60; with $5 additional for Class A and gas pipe.

Coke.—Prices of both standard foundry and furnace coke are stronger, partly as a result of better domestic demand as cold weather approaches. Foundry is quoted at $4.25 to $5 per ton, Connellsville, and furnace grade at $3.50 to $3.75 per ton. Delivered prices of standard foundry are $8.16 to $8.91, Newark and Jersey City, N. J., $8.28 to $9.03, northern New Jersey, and $9.04 to $9.79 New York or Brooklyn. By-product foundry coke continues at $9.59 to $10.77, delivered Newark or Jersey City, N. J.

Reinforcing Bars.—E. T. Edwards, Columbia, Pa., will furnish 2500 tons of concrete reinforcing bars for approaches to two bridges across the Kill Van Kull, Staten Island. No other sizable jobs have been reported let during the last week. The contract has been let for the Kymson Building, New York, which will take 2000 tons, but no new inquiries of any size have come on the market. The bars for the Staten Island bridge approaches are reported to have been bought at a figure below the regular mill price of 2c., Pittsburgh, and there are indications that the considerable tonnage yet to be placed on those jobs may be refused to local sellers unless the quoted price is shaded. The New York warehouse price remains steady at 3.15c., delivered at job, and Youngstown warehouses quote 2.50c., or 2.87½c., delivered New York.

Old Material.—The market is largely unchanged from last week. Consumers at Coatesville, Claymont, Pottsville and Pencoyd have suspended shipments, mills at Harrisburg and Lebanon, Pa., are out of the market, a Phoenixville company has reduced its prices on bundled skeleton, turnings and stove plate 50c. per ton and consumers at Conshohocken and Bethlehem, Pa., continue to make numerous rejections of material not considered up to specifications. No. 1 heavy melting steel is being purchased at $15.50 to $16.50 per ton, delivered eastern Pennsylvania, and as a result of rigid inspection, little material is reported coming out for shipment on the lower price. Bundled skeleton and machine shop turnings are quoted at $13 per ton by a Phoenixville user, but brokers with contracts at higher prices are still paying up to $13.50 and slightly higher for this delivery. This applies also to stove plate, a consumer at Phoenixville having dropped the price to $13.50 per ton. Brokers, however, are paying $13.50 and higher to fulfill contracts, with material scarce. A local foundry consumer of stove plate has dropped its price to $13.75 per ton, delivered, and brokers are paying $13.25. Borings and turnings have been reduced to $12 per ton, delivered Bethlehem, Pa.

Buying prices per gross ton, New York, follow:

Heavy melting steel (yard)	$10.00 to $10.50
Heavy melting steel (railroad or equivalent)	12.85 to 13.00
Rails for rolling	13.00 to 13.50
Steel car axles	20.25 to 20.75
Iron car axles	24.50 to 25.25
No. 1 railroad wrought	14.25 to 15.25
Forge fire	10.00 to 10.50
No. 1 yard wrought, long	13.25 to 14.25
Cast borings (steel mill)	10.00 to 10.50
Cast borings (chemical)	13.50 to 14.00
Machine shop turnings	9.25 to 9.50
Mixed borings and turnings	9.25 to 9.50
Iron and steel pipe (1 in. diam., not under 2 ft. long)	12.25
Stove plate (steel mill)	10.00 to 10.50
Stove plate (foundry)	11.25 to 11.75
Locomotive grate bars	11.00 to 11.50
Malleable cast (railroad)	16.00 to 16.50
Cast iron carwheels	13.00 to 13.50
No. 1 heavy breakable cast	13.00 to 13.50

Prices which dealers in New York and Brooklyn are quoting to local foundries per gross ton follow:

No. 1 machinery cast	$16.50 to $17.00
No. 1 heavy cast (columns, building materials, etc.), cupola size	15.00 to 15.50
No. 2 cast (radiators, cast boilers, etc)	14.00 to 14.50

Cleveland

Steel Bookings Well Maintained—Sheet Advances Not Yet General

CLEVELAND, Sept. 28.—September will end with practically the same volume of tonnage entered in finished steel as during August, and with good order books to start the fourth quarter. Consumers have specified against practically all the steel bars, plates and structural material covered by their third quarter contracts. Buyers who have placed fourth quarter contracts for these materials have covered for about the same amount as during the third quarter. Some of the mills are not seeking fourth quarter contracts, and many consumers are indifferent about placing contracts. Consumers' stocks remain rather low, and there is considerable demand for quick shipments. The automotive industry appears to be going ahead at about its recent pace, but the general attitude of motor car builders is to buy steel and parts only for early requirements, and makers of forgings and other automobile parts are being pressed for shipments.

The McKinney Steel Co. plans to place its 10-in. bar mill in operation about Nov. 1, but it is not expected to become much of a factor in the market this year. Some effort is being made to secure concessions

on steel bars, but the price apparently remains firm at 2c., Pittsburgh, and the contracts taken for the fourth quarter have been at that price. Plates are firm at 1.90c., Pittsburgh. Light plates are in good demand. There is little activity in the building field, and competition for business has become keener. Structural material is firm at 2c. Screw stock is dull, and the market on this material is not firm. Wire products are in light demand.

While most of the independent mills have fallen in line with the recent $2 a ton advance, the old price of 3c. per lb. for black, 3.85c. for galvanized (both No. 24 gage), and 2.30c. for blue annealed sheets are still fairly common, particularly for early shipment, and purchases can be made at these prices on a Youngstown as well as a Pittsburgh base. One jobber who is still quoting these prices on car lots for mill shipment announces an advance to the new prices effective Oct. 1. Although some business is coming out at the higher prices, a good deal of the tonnage on the books was taken at the old prices. While the current demand is fairly heavy, few consumers are buying for the entire quarter. Many of the mills have enough specifications to keep them running well into November.

Iron Ore.—A few sales of small lots for fill-in purposes are being made, but buying for the season is practically over. The movement is still heavy, and September shipments will total close to 10,000,000 tons. Shippers estimate that the movement by water this year will be from 57,500,000 to 58,000,000 tons.

Pig Iron.—Sales and inquiries were lighter the past week than during the previous week. One Lake furnace sold 2000 tons of foundry iron for the first quarter to western Ohio, Indiana and Michigan consumers, getting the market prices prevailing at present in those territories for some of the iron and a 25c. a ton advance for the remainder. Lake furnaces that usually supply those sections see little possibility of getting better than the ruling prices for iron for the first quarter delivery unless the Valley price advances. Local furnaces have not yet named prices for the first quarter, but are making some effort to get prices on a higher basis and one Cleveland producer which recently made a 25c. a ton advance has marked its price up another 25c. to $18.50, furnace, for outside shipment. Another Cleveland producer is quoting $18.25, furnace. In the Valley district the market seems well established at $18, furnace, so that Cleveland producers are at a price disadvantage except for shipment to points where they have a freight advantage. Furnaces that depend on Connellsville coke are not inclined to open their books for the first quarter until they know what the coke will cost them, and buyers, if they retain their present attitude, will not pay more than present prices for the first quarter. Under these conditions an early buying movement seems improbable. For Cleveland delivery the market is firm at $19, furnace, and a few small-lot sales are reported. The Lake iron price is unchanged at $19, furnace, for delivery in western Ohio and Indiana and at $19.50, furnace, in Michigan. The National Malleable & Steel Castings Co. has placed 10,000 tons of various grades of iron for its different plants, including about 2000 tons of basic for its Sharon, Pa., works. The Muncie Malleable Iron Co., Muncie, Ind., which inquired for 10,000 tons of malleable for the first quarter, is understood to have closed for a portion of that amount. A Springfield, Ohio, melter is inquiring for 2000 tons of foundry iron for the last and first quarters, and a Mansfield, Ohio, consumer for 1000 tons for the first quarter.

Quotations below, except on basic and low phosphorus iron, are delivered Cleveland, and for local iron include a 50c. switching charge. Ohio silvery and Southern iron prices are based on a $3.02 freight rate from Jackson and $6.01 from Birmingham:

Basic Valley furnace	$17.50 to $18.00
N'th'n No. 2 fdy., sil. 1.75 to 2.25.	19.50
Southern fdy., sil. 1.75 to 2.25	26.01
Malleable	19.50
Ohio silvery, 8 per cent	30.52
Standard low phos., Valley furnace	28.00

Semi-Finished Steel.—While considerable business has been placed in fourth quarter contracts, some consumers are not making contracts for the quarter, seeing no advantage in so doing as they do not expect a price advance. Specifications continue heavy. The market is firm at $36, Cleveland and Youngstown, for sheet bars and $35 for large billets and slabs.

Cold-Rolled Strips.—Mills are getting a fair volume of orders, but consumers are buying only for early requirements. Prices have not recovered from the recent decline. The common range is from 3.25c. to 3.40c., Cleveland, although small-lot sales are being made at 3.50c.

Warehouse Business.—Sales continue good, and the September volume will be about the same as in August. Sheet jobbers announce that for the present they will not follow the advance in mill prices by marking up prices out of stock.

Reinforcing Bars.—Small lots are in good demand, but no new inquiry has come out requiring round tonnages. Rail steel bars are unchanged at 1.80c., mill, which might be shaded on a round lot.

Bolts, Nuts and Rivets.—Consumers are placing last quarter contracts freely for bolts, nuts and rivets at present prices, which were recently reaffirmed for that delivery. Bolt and nut specifications have fallen off slightly, but September business will be little short of August bookings. Rivet specifications are good.

Coke.—The market is stronger. Few producers are willing to quote furnace coke for the first quarter, although furnace operators that are considering the blowing in of stacks wish to tie up for fuel for a longer period before resuming operations. A Cleveland company that is planning to blow in a Valley stack has so far been able to get a quotation from only one producer for delivery beyond the last quarter. Connellsville foundry coke is firmer, ranging from $4.50 to $5.25, ovens. Foundry heating coke ranges from $3.50 to $3.75, ovens. By-product egg coke has become fairly active and is quoted at $6.25, Ohio ovens.

Old Material.—The market is very dull and sentimentally weak, due to the absence of buying and the holding up of shipments by some of the Cleveland and Valley district mills. Machine shop turnings are particularly weak, because dealers are cleaned up on old orders and there is no new demand from the mills. The price on this grade has declined nearly $1 a ton. One sale to a dealer was made at $10.25, delivered, Cleveland mill. Dodge Brothers, Detroit, have issued an October scrap list of 4500 tons. The Big Four railroad will take bids Sept. 30 on 8500 tons.

We quote per gross ton delivered consumers' yards in Cleveland:

Heavy melting steel	$15.25 to $15.75
Rails for rolling	16.25 to 16.50
Rails under 3 ft.	18.00 to 18.50
Low phosphorus billet, bloom and slab crops	19.00 to 19.50
Low phosphorus sheet bar crops.	18.50 to 19.00
Low phosphorus plate scrap	18.50 to 19.00
Low phosphorus forging crops	16.75 to 17.25
Cast iron borings	11.75 to 12.00
Machine shop turnings	10.25 to 10.50
Mixed borings and short turnings	11.75 to 12.00
Compressed sheet steel	14.00 to 14.25
No. 1 railroad wrought	11.50 to 12.00
No. 2 railroad wrought	15.50 to 15.75
Railroad malleable	18.00 to 18.50
Light bundled sheet stampings	12.00 to 12.50
Steel axle turnings	12.50 to 13.00
No. 1 cast	16.50 to 17.00
No. 1 busheling	12.50 to 13.00
No. 2 busheling	11.75 to 12.00
Drop forge flashings, 15 in. and under	11.50 to 12.00
Railroad grate bars	12.50 to 13.00
Stove plate	12.50 to 13.00
Pipes and flues	10.00 to 10.50

Warehouse Prices, f.o.b. Cleveland

	Base per Lb.
Plates and structural shapes	3.00c.
Mild steel bars	3.00c.
Cold-finished rounds and hexagons	3.90c.
Cold-finished flats and squares	4.40c.
Hoops and bands	3.65c.
No. 24 black sheets	3.70c.
No. 10 blue annealed sheets	3.15c.
No. 24 galvanized sheets	4.55c.
No. 9 annealed wire, per 100 lb.	$3.00
No. 9 galvanized wire, per 100 lb.	3.45
Common wire nails, base, per keg	3.00

San Francisco

Shipment of 5000 Tons of Belgian Steel Arrives—Dam Bids to Be Taken

SAN FRANCISCO, Sept. 25 (*By Air Mail*).—During the week a shipment of 5000 tons of foreign steel arrived at this port from Belgium. About 2500 tons is being unloaded here, and an equal amount will be delivered in the Pacific Northwest. Of the tonnage laid down here, about 1000 tons is structural material, approximately 800 tons is reinforcing steel, and about 700 tons is soft steel bars. Foreign shapes are quoted at about $10 per ton below domestic steel. Belgian concrete bars are quoted at about 1.90c. to 2c., duty paid, c.i.f. Coast ports, and about 1.70c. to 1.80c. is asked for foreign merchant bars.

Bids on 2250 tons of reinforcing bars, 700 tons of shapes, 450 tons of cast iron gates and valves, and on a quantity of other materials, supplies and equipment will be called for soon at Los Angeles by the bureau of Indian affairs, Department of the Interior, for the construction of the proposed Coolidge Dam near San Carlos, Ariz. This dam will be used for the storage of 1,300,000 acre ft. of water for the irrigation of 100,000 acres of land near Florence and Casa Grande, Ariz.

The Southern Pacific Co., San Francisco, has awarded 1000 tons of plates and shapes for the construction of two ferry boats to the Bethlehem Shipbuilding Corporation. No action has yet been taken by the Golden Gate Ferry Co. on the bids received one week ago for the construction of five ferry boats, for which about 1200 tons of steel will be required. The wharf for this company, which is to be built at the foot of University Avenue, Berkeley, Cal., will be erected by the San Francisco Bridge Co., which has not yet placed the 800 tons of reinforcing steel required for this project. Bids on 1600 to 3300 tons of concrete bars for Pier 45, to be built on the San Francisco water front by the State Board of Harbor Commissioners, have been closed, but no award will be made until the latter part of next week.

Pig Iron.—The Southern Pacific Co. is inquiring for 1000 tons of foundry iron. Otherwise, inquiries and orders have been small. Specifications for the fourth quarter have been slow to develop. Local foundries, for the most part, are not especially active. Quotations are unchanged.

*Utah basic	$25.00 to $26.00
*Utah foundry, sil. 2.75 to 3.25	25.00 to 26.00
**English foundry, sil. 2.75 to 3.25	25.00
**Indian foundry, sil. 2.75 to 3.25	25.00
**German foundry, sil. 2.75 to 3.25	24.25
**Dutch foundry, sil. 2.75 to 3.25	22.50
**Belgium foundry, sil. 2.75 to 3.25	22.00

*Delivered San Francisco.
**Duty paid, f.o.b. cars San Francisco.

Shapes.—Lettings for the week total 722 tons; fresh inquiries call for 1425 tons. The Yosemite Portland Cement Co., Merced, Cal., probably will require 800 tons for proposed additions and improvements to its plant instead of 200 to 300 tons as reported one week ago. Eastern mills continue to quote plain material at 2.35c., c.i.f. Coast ports.

Plates.—The Atlantic Gulf & Pacific Co., San Francisco, has placed 250 tons of sheet piling for shipment to Manila, P. I., with the United States Steel Products Co., and it also has put out an inquiry for 200 tons of plates for shipment to its Manila warehouse. The 260 tons required by the city of Santa Barbara for a pipe line has been placed with the Western Pipe & Steel Co. Eastern mill quotations are unchanged at 2.30c., c.i.f. Coast ports.

Bars.—Bids have closed on several projects which require good-sized tonnages of concrete bars, and jobbers during the week have taken an aggregate of about 1000 tons. The local price situation is still somewhat uncertain because of the keen competition between sellers of foreign and domestic steel. Jobbers selling imported bars are asking 2.10c. to 2.15c., base, per lb. on lots of about 200 tons. Domestic steel in the same quantity is quoted at about 2.30c. to 2.35c., base, per lb., although occasionally slightly lower figures have been named for competitive reasons. On lots of less than 200 tons, quotations range from about 2.40c. to 3c., base, per lb. Building construction, particularly concrete work, is still somewhat hampered by the local carpenters' strike, which started April 1.

Cast Iron Pipe.—B. Nicoll & Co. has taken 175 tons of 4 and 6-in. Class B cast iron pipe for the city of Burbank, Cal., and an aggregate of 120 tons through contractors' private lettings during the week. The United States Cast Iron Pipe & Foundry Co. has been awarded 555 tons of 4 to 12-in. Class B cast iron pipe for the city of San Diego, Cal. Plans have been prepared for street improvements in San Diego which will require 291 tons of 4, 6 and 8-in. Class C cast iron pipe, but no date has yet been set for bids. The Bolinas Public Utility District, Bolinas, Cal., is expected to call for bids on 552 tons of 8-in. pipe within the next few weeks. The California Trenching Co., Los Angeles, is low bidder on 234 tons of 4 and 6-in. Class B pipe for street improvements in Los Angeles. The city of Ashland, Ore., will hold a referendum Nov. 2 on a bond issue of $500,000 for additions to its water system. Bids will be taken Sept. 28, through Alexander & Baldwin, San Francisco, on 2217 tons of 6, 8 and 12-in. Class C cast iron pipe for a pipe line at Koko Head Park, T. H. Quotations are firm at about $50 base, water shipment, San Francisco.

Steel Pipe.—The Grinnell Co. of the Pacific has been awarded a contract for the installation of a sprinkler system for the McCormick Lumber Co., which will require about 200 tons of line pipe.

Tin Plate.—A San Francisco packer has bought from local stocks about 2100 base boxes of tin plate to fill a temporary shortage. Other packers also are understood to have run short of material this year because of the large packs of fruits, vegetables and sea food. This has been an exceptionally good year for most of the packers, and it is expected that future specifications for tin plate will be substantial.

Warehouse Business.—Slightly heavier buying, and somewhat larger inquiry have featured business during the week. Quotations are unchanged.

Coke.—Activity during the week has been limited to sales of small lots only. Few inquiries of importance have appeared, although fourth quarter business is expected to bring out large bookings. Quotations on German by-product coke continue at about $12 to $12.50 per net ton at incoming dock.

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and structural shapes	3.30c.
Mild steel bars and small angles	3.30c.
Small channels and tees, ¾-in. to 2¾-in.	3.90c.
Spring steel, ¾-in. and thicker	7.00c.
No. 24 black sheets	4.90c.
No. 28 black sheets	5.15c.
No. 10 blue annealed sheets	3.90c.
No. 24 galvanized sheets	5.65c.
No. 28 galvanized sheets	6.15c.
Common wire nails, base per keg	$3.75
Cement coated nails, base per keg	3.00

Birmingham

Pig Iron Breaks $1 a Ton—Look for Steel Demand from Storm Zone

BIRMINGHAM, Sept. 28.—A $1 reduction has been made in foundry pig iron prices, bringing No. 2 grade down to $20, Birmingham, and numerous sales have been made at that figure. This marks the first break in a deadlock of long standing between producers and consumers of iron. Twelve blast furnaces in this State are on foundry iron, 11 are on basic and one is on special iron. Producers, however, are entering the fourth quarter with only a few weeks of their output sold. The prospects for pig iron consumption in this district are good, but melters have been con-

tending for some time that they must have lower prices to hold their trade.

We quote per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 2 foundry, 1.75 to 2.25 sil.	$20.00
No. 1 foundry, 2.25 to 2.75 sil.	20.50
Basic	20.00
Charcoal, warm blast	30.00

Rolled Steel.—The market is active, and several finishing mills are working to capacity, in some instances day and night. A considerable tonnage of rails is being exported. Rail business booked and in prospect promises to keep the mill here active indefinitely. Steel fabricating shops are also very busy meeting current demand. The recent storm in Florida and the lower portion of Alabama is expected to result in urgent calls for steel. Reports indicate considerable damage to rails, which were torn from the ties and twisted. Structural shapes and bars still hold at 2.15c. to 2.25c. per lb., base Birmingham, and plates at 2.05c. to 2.15c. No. 10 blue annealed sheets are quoted at 2.60c. to 2.65c., Birmingham, No. 24 black sheets at 3.30c. to 3.40c., and No. 24 galvanized sheets at 4.15c. to 4.25c.

Cast Iron Pipe.—New business has declined, but pressure pipe makers still have considerable unfilled tonnage. One of the companies announces that it is taking orders for centrifugal pipe cautiously, because it is so far behind on present bookings. Although most shops are operating at capacity, prices are weak, ranging from $39 to $40, Birmingham, for 6-in. and larger diameters. The recent storm has resulted in the diversion of shipments to other sections pending the restoration of order in the Florida cities affected. There is no immediate prospect for a curtailment of pipe production. No pipe stocks are being accumulated, since shipments continue to equal output.

Coke.—Independent producers have no surplus coke, and the ovens of iron and steel companies are not overburdened with stock either. A few beehive ovens are being kept in operation to meet demands of consumers who have not abandoned the use of that class of coke. Preparations are being made by two of the iron and steel companies to increase coal output in keeping with the requirements of their coke works.

Old Material.—Buying is at a low ebb. There is some demand for cast scrap, but heavy melting steel, even at the low and weak quotation of $13, commands very little attention. Dealers are well stocked with all kinds of old material. Quotations have not changed in several weeks. Two of the larger users of heavy melting steel are consuming the product steadily but are not yet sounding out the market for further requirements.

We quote per gross ton, f.o.b. Birmingham district yards, as follows:

Cast iron borings, chemical	$15.00 to $16.00
Heavy melting steel	12.00 to 13.00
Railroad wrought	12.00 to 13.00
Steel axles	17.00 to 18.00
Iron axles	17.00 to 18.00
Steel rails	13.00 to 14.00
No. 1 cast	16.50 to 17.00
Tramcar wheels	16.00 to 17.00
Carwheels	16.00 to 16.50
Stove plate	14.00 to 14.50
Machine shop turnings	7.50 to 8.00
Cast iron borings	7.50 to 8.00
Rails for rolling	15.00 to 16.00

Now the Corrigan, McKinney Steel Co.

The McKinney Steel Co., Cleveland, will restore the name of Corrigan to its incorporated name and the company will hereafter be known as the Corrigan, McKinney Steel Co. The change has received the unanimous approval of the stockholders and had been expected since James W. Corrigan, son of the founder of the company, became president, as successor to Price McKinney last year. The name Corrigan has been a part of the title of the organization since it was formed with the exception of eight years. Organized as Dallibra, Corrigan & Co. more than forty years ago, the name was changed to Corrigan, Ives & Co., and later to Corrigan, McKinney & Co. In 1918 it became the McKinney Steel Co.

Cincinnati

Pig Iron Sold for First Quarter—General Decline in Scrap

CINCINNATI, Sept. 28.—With the appearance of further important inquiries for first-quarter iron, attention has been focused on prices for next year. Sellers in the southern Ohio district are well fortified with commitments over the remainder of the year and are hesitant about quoting on foundry iron for January and February delivery. One producer is submitting prices only on individual inquiries as they develop and is not soliciting 1927 business, while another has not yet decided what its attitude will be. Meanwhile several attractive tonnages for first-quarter delivery have been placed with Lake interests. Ironton furnaces are obtaining $20, base furnace, for small lots of foundry iron, but in territory up-State $19.50, furnace, still prevails on sizable tonnages. Weakness has cropped out in Alabama iron, which has declined to $20, base Birmingham, a drop of $1 a ton from the previous price. The downward revision, however, will have practically no effect in this market, because Northern iron still can downward revision, however, will have practically no effect in this market, because Northern iron still can be delivered here at from $2 to $2.50 a ton less than Southern iron. Malleable iron is active in Indiana and northern Ohio, but most of the business booked in the past week has gone to Lake producers at quotations ranging from $19 to $19.50, base furnace. Jackson County silvery iron is moving at a moderate rate, and prices remain firm at $27.50, furnace, for 8 per cent. Inquiries before the trade include 2000 tons of foundry iron for a Springfield, Ohio, melter and 500 to 1000 tons for the Swain Robinson Co., Richmond, Ind. The Belfont Steel & Wire Co. this week will resume the operation of its Belfont furnace, which has been banked for repairs.

Based on freight rates of $3.69 from Birmingham and $1.89 from Ironton, we quote f.o.b. Cincinnati:

Alabama fdy., sil. 1.75 to 2.25 (base)	$23.69
Alabama fdy., sil. 2.25 to 2.75	24.19
Tennessee fdy., sil. 1.75 to 2.25	24.69
Southern Ohio silvery, 8 per cent	29.39
So. Ohio fdy., sil. 1.75 to 2.25	$21.39 to 21.89
So. Ohio malleable	20.89

Finished Material.—Despite the fact that there has been a slight recession in specifications and orders, total bookings in September will reach substantial proportions. Two producers estimate that business in the first nine months of this year was 10 per cent ahead of that in the corresponding period in 1925. Since prices will remain unchanged in the fourth quarter, some consumers have decreased specifications against existing contracts and are taking only enough tonnage to meet immediate requirements. Consequently mills are carrying over into the last quarter a moderate amount of business. The wire market has grown stronger in the past two weeks. Common wire nails are being sold by an Ironton, Ohio, manufacturer at $2.79 per keg, delivered Cincinnati, which is equivalent to $2.65, mill, plus a barge rate of 14c. Plain

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and structural shapes	3.40c.
Bars, mild steel or iron	3.20c. to 3.30c.
Reinforcing bars	3.20c. to 3.30c.
Hoops	4.00c. to 4.25c.
Bands	3.95c.
Cold-finished rounds and hexagons	3.85c.
Squares	4.35c.
Open-hearth spring steel	4.75c. to 5.00c.
No. 24 black sheets	4.05c.
No. 10 blue annealed sheets	3.60c.
No. 24 galvanized sheets	4.90c.
Structural rivets	3.75c.
Small rivets	65 per cent off list
No. 9 annealed wire, per 100 lb.	$3.00
Common wire nails, base per keg	2.95
Cement coated nails, base per 100-lb. keg	3.15
Chain, per 100 lb.	7.55
	Net per 100 Ft.
Lap welded steel boiler tubes, 2-in.	$18.00
4-in.	38.00
Seamless steel boiler tubes, 2-in.	19.00
4-in.	39.00

wire is firm at $2.50 per 100 lb., Ironton or Pittsburgh. Business in fencing is becoming a more important factor daily, but the volume of sales will depend upon the weather which prevails in the next month. Bars are bringing 2c., base, Pittsburgh, and a few orders for single carloads have been taken at 2.10c. Demand for structural shapes has tapered off somewhat, but prices are steady at 2c., base, Pittsburgh. The movement of tank plates also has declined recently. Quotations, however, are steady at 1.90c., base, Pittsburgh. In the sheet market producers generally have made an effort to advance black and galvanized sheets $2 a ton to 3.10c. and 3.95c., base, Pittsburgh, respectively Material still is available, however, at the old prices. Blue annealed sheets are selling at 2.30c., base, Pittsburgh. The number of new structural projects has declined, and little important work is before the trade. The Louisville & Nashville has purchased 8000 kegs of track bolts, 16,000 kegs of track spikes, and 4300 tons of angle bars. Bids on 1200 tons of plates have been taken by the Big Four railroad.

Reinforcing Bars.—The Pollak Steel Co. will supply 250 tons of bars for a building of the Westinghouse Electric & Mfg. Co., Detroit, 140 tons for the Hamilton Community Hotel, Hamilton, Ohio, and 230 tons for the Cincinnati Chamber of Commerce. Bids have been taken on 1200 tons for three sections of Central Parkway, Cincinnati, which is being constructed by the Cincinnati Rapid Transit Commission. An award of 120 tons for a high school at Newport, Ky., is expected soon. New billet bars continue to bring 2c., base, Pittsburgh, and rail steel bars 1.90c., base, mill.

Warehouse Business.—While sales have fallen off somewhat in the past week, the total volume of business in September will measure up to that in the previous month. Demand has been well distributed among all products. Prices are steady and no changes are anticipated in the next few weeks.

Coke.—Prices of by-product foundry and domestic coke will be unchanged during the next month. The present schedule calls for a delivered price of $9.64 on by-product foundry grades, $7.14 on No. 2 nut and $7.64 on egg and walnut. Weakness in beehive domestic coke has developed both in the Detroit and local markets. In Michigan, dealers have had difficulty in disposing of considerable tonnages received on consignment. The cold weather of the past few days is expected to stimulate the demand for domestic grades. Specifications and orders for foundry coke in September were about 10 per cent ahead of those in August.

Old Material.—Mills in this territory have sufficient stock to supply their requirements during the next two months, and local dealers, therefore, are unable to secure satisfactory prices for their material. The lack of interest on the part of consumers has had a depressing effect on prices, heavy melting steel, as well as many other items, having declined 50c. a ton in the past week. The Big Four railroad has a small list closing in a few days.

We quote dealers' buying prices, f.o.b. cars, Cincinnati:

	Per Gross Ton	
Heavy melting steel	$13.50	$14.00
Scrap rails for melting	13.00 to	13.50
Short rails	18.50 to	19.00
Relaying rails	26.50 to	27.00
Rails for rolling	14.50 to	15.00
Old carwheels	12.50 to	13.00
No. 1 locomotive tires	17.50 to	18.00
Railroad malleable	15.00 to	15.50
Agricultural malleable	14.00 to	14.50
Loose sheet clippings	8.00 to	8.50
Champion bundled sheets	9.50 to	10.00
Per Net Ton		
Cast iron borings	7.50 to	8.00
Machine shop turnings	7.00 to	7.50
No. 1 machinery cast	18.00 to	19.00
No. 1 railroad cast	15.00 to	15.50
Iron axles	20.50 to	21.00
No. 1 railroad wrought	10.00 to	10.50
Pipes and flues	8.50 to	9.00
No. 1 busheling	10.00 to	10.50
Mixed busheling	6.50 to	7.00
Burnt cast	7.50 to	8.00
Stove plate	10.00 to	10.50
Brake shoes	10.50 to	11.00

Boston

Steady Buying of Pig Iron—Concessions of $10 a Ton on Foreign Bars

BOSTON, Sept. 28.—Steady buying of pig iron is going on, both for last quarter and early 1927 delivery, but average transactions are in comparatively small lots, the aggregate business for the week totaling about 6000 tons. The General Fire Extinguisher Co., Providence, R. I., will probably close today on 2000 tons No. 2X and No. 1X. Recent sales include 600 tons of No. 2 plain and No. 2X to a Worcester, Mass., company, to be divided with a Providence subsidiary; 500 tons of No. 1X and No. 2X to the Framingham Foundries, Framingham, Mass., and 1000 tons of basic iron to a Bridgeport, Conn., melter. The Lincoln Iron Works, Rutland, Vt., has an inquiry out, but it does not specify tonnage wanted. New York State producers are holding to $20, base furnace. The Port Henry, N. Y., furnace has gone out of blast for relining, but will be blown in again early in November. Contracts are being filled from stock. One Buffalo maker is booking business for first half shipment at $19, base furnace. Eastern Pennsylvania furnaces apparently are not booking business beyond Dec. 31, although deliveries on recent business booked may extend into 1927. Little Virginia and Alabama iron has sold in this territory of late.

We quote delivered prices on the basis of the latest sales as follows, having added $3.65 freight from eastern Pennsylvania, $4.91 from Buffalo, $5.92 from Virginia, and $9.60 from Alabama:

East. Penn., sil. 1.75 to 2.25	$24.15 to	$24.65
East. Penn., sil. 2.25 to 2.75	24.65 to	25.15
Buffalo, sil. 1.75 to 2.25	22.91 to	23.91
Buffalo, sil. 2.25 to 2.75	23.41 to	24.41
Virginia, sil. 1.75 to 2.25	27.92 to	28.42
Virginia, sil. 2.25 to 2.75	28.42 to	28.92
Alabama, sil. 1.75 to 2.25		30.60
Alabama, sil. 2.25 to 2.75		31.10

Finished Material.—Prices on plates and standard structural shapes are holding well, and business is somewhat more active. Steel bars also are selling in greater volume, but the average individual order is small. The market appears firmly established on a 2c. per lb., base Pittsburgh. Domestic reinforcing bars are experiencing still greater competition from imported stock at prices at $8 to $10 a ton below those quoted on domestic. Fabricators report that numerous small jobs are coming on the market, but only a few large ones.

Cast Iron Pipe.—It is reported the Warren Foundry & Pipe Co. will furnish approximately 6000 tons of pipe for the South Essex, Mass., sewerage outfall. This is the largest tonnage placed in New England for some time. Gloucester, Mass., closed bids Monday evening, Sept. 27, on 1000 tons of 24-in. pipe for a sewer outfall. No other open municipal business is reported. On the other hand, the pipe companies are closing good tonnages privately. Concessions are being made on large-sized pipe, but prices on small pipe hold very firm. Prices quoted openly on pipe are: 4-in., $60.10 per net ton, delivered common Boston freight rate points; 6 to 12-in., $55.10 to $56.10; larger pipe, $54.10 to $55.10. The usual $5 differential is asked on Class A and gas pipe.

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Soft steel bars and small shapes	3.265c.
Flats, hot-rolled	4.15c.
Reinforcing bars	3.265c. to 3.54c.
Iron bars—	
Refined	3.265c.
Best refined	4.60c.
Norway, rounds	6.60c.
Norway, squares and flats	7.10c.
Structural shapes—	
Angles and beams	3.365c.
Tees	3.365c.
Zees	3.465c.
Plates	3.365c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tire steel	4.50c. to 4.75c.
Bands	4.015c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hexagons	4.05c.
Squares and flats	4.55c.
Toe calk steel	6.00c.

Coke.—There has been a further increase in specifications on last half contracts for New England by-product foundry, especially in Connecticut and in the region of the Connecticut Valley. The increase is still gradual, however. Both the New England Coal & Coke Co. and the Providence Gas Co. are shipping foundry fuel on a basis of $12, delivered, within a $3.10 freight rate zone. Business in Connellsville district foundry coke is at a minimum. Good fuel is still available at $5 a ton, ovens, or $10.55, delivered.

Old Material.—Offers on machine shop turnings, long bundled cotton ties and rails for rerolling average 50c. a ton lower than a week ago. Old material prices, otherwise, show little variation, despite the fact that less scrap was moved the past week than in the previous seven days. The best current bids on rails for rerolling are $12.50 a ton on cars, which is but 50c. a ton more than is offered for scrap rails. There seem to be better prices for stove plate, presumably because of a real scarcity of this material, but few actual sales are reported. One sale of No. 1 machinery cast to a dealer is reported at $19.50 a ton, delivered, but $19 is the usual top price. Textile machinery cast is bringing no more than No. 1 machinery, the 50c. a ton spread having disappeared. The market for pipe is dead. Heavy melting steel is still the most active material.

The following prices are for gross-ton lots delivered consuming points:

Textile cast	$18.50 to $19.00
No. 1 machinery cast	18.50 to 19.00
No. 2 machinery cast	16.50 to 17.00
Stove plate	14.00 to 14.50
Railroad malleable	19.50 to 20.00

The following prices are offered per gross-ton lots, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	$11.50 to $12.00
No. 1 railroad wrought	12.50 to 13.00
No. 1 yard wrought	11.25 to 11.50
Wrought pipe (1 in. in diameter, over 2 ft. long)	10.50 to 11.00
Machine shop turnings	8.00 to 8.50
Cast iron borings, chemical	10.50 to 11.00
Cast iron borings, rolling mill	9.00 to 9.25
Blast furnace borings and turnings	8.00 to 8.50
Forged scrap	9.00 to 9.50
Bundled skeleton, long	9.00 to 9.50
Forged flashings	9.00 to 9.50
Bundled cotton ties, long	8.00 to 8.50
Bundled cotton ties, short	8.50 to 9.00
Shafting	16.50 to 17.00
Street car axles	16.50
Rails for rerolling	12.00 to 12.50
Scrap rails	11.50 to 12.00

St. Louis

Pig Iron Buying Revives—Heavy Bookings in Tin Plate and Sheets

ST. LOUIS, Sept. 28.—Pig iron sales of the Granite City furnace for the week were among the best in the last five months, amounting to 8000 tons. Of that total, 5000 tons was basic iron sold to a steel maker in this district, while the remainder was foundry iron, including 500 tons for an upper Illinois melter. All of this business was for fourth quarter delivery. Inquiries are pending for 5000 to 6000 tons of foundry iron for fourth quarter, the largest being 1000 tons for a Kansas user. A Missouri melter has bought 500 tons from a Chicago producer. Increased melt and confidence in the stability of the market are believed to have caused this new buying movement. Prices are nominally unchanged.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices, $2.16 freight from Chicago, $4.42 from Birmingham, all rail, and 81c. average switching charge from Granite City:

Northern fdy., sil. 1.75 to 2.25	$23.16
Northern malleable, sil. 1.75 to 2.25	23.16
Basic	23.16
Southern fdy., sil. 1.75 to 2.25	24.42
Granite City iron, sil. 1.75 to 2.25	$22.81 to 23.31

Finished Iron and Steel.—The sheet and tin plate departments of the National Enameling & Stamping Co. are now running at 100 per cent of capacity, and deliveries are extending, being 10 weeks behind on tin plate, six weeks behind on galvanized sheets and seven weeks behind on blue annealed sheets. Warehouse business was not so good the last week as it has been for the last few months. A lack of large orders was the cause of the drop. Business in structural steel and reinforcing bars is dull.

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and structural shapes	3.25c.
Bars, mild steel or iron	3.15c.
Cold-finished rounds, shafting and screw stock	3.75c.
No. 24 black sheets	4.45c.
No. 10 blue annealed sheets	3.60c.
No. 24 galvanized sheets	5.25c.
Black corrugated sheets	4.65c.
Galvanized corrugated sheets	5.30c.
Structural rivets	3.65c.
Boiler rivets	3.85c.
	Per Cent Off List
Tank rivets, ⅞-in. and smaller	70
Machine bolts	50 and 5
Carriage bolts	47½
Lag screws	55 and 5
Hot-pressed nuts, square, blank or tapped	3.25c. off per lb.
Hot-pressed nuts, hexagons, blank or tapped	3.75c. off per lb.

Coke.—The demand for foundry coke is stronger, and shipments from by-product ovens are heavy. Domestic grades are also in better demand, especially from the Northern sections of the country.

Old Material.—Railroad lists totaling nearly 50,000 tons closed during the week; the dealers' bids were lower than on previous offerings. The American Car & Foundry Co. has received an order for 1000 cars from the American Refrigerator Transit Co., but consumers generally are waiting for more equipment orders before buying additional old material. Dealers are purchasing only to fill contracts and, if there are any bargains to be had, to lay down in their yards. Fresh railroad lists include: Baltimore & Ohio, 20,000 tons; Chicago, Burlington & Quincy, 4700 tons; Chicago, Milwaukee & St. Paul, 5300 tons; Clover Leaf, 4500 tons; Big Four, 4200 tons; Union Pacific, 2500 tons; St. Louis-San Francisco, 1700 tons; Gulf Coast Lines, Wabash and Chicago & Alton, 1400 tons each.

We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

	Per Gross Ton
Iron rails	$12.00 to $12.50
Rails for rolling	16.75 to 17.25
Steel rails less than 3 ft.	16.75 to 17.25
Relaying rails, 60 lb. and under	20.50 to 23.50
Relaying rails, 70 lb. and over	26.50 to 29.00
Cast iron carwheels	15.25 to 15.75
Heavy melting steel	13.75 to 14.25
Heavy shoveling steel	13.75 to 14.25
Frogs, switches and guards cut apart	15.50 to 16.00
Railroad springs	17.50 to 18.00
Heavy axle and tire turnings	11.00 to 11.50
No. 1 locomotive tires	16.00 to 16.50
	Per Net Ton
Steel angle bars	13.00 to 13.50
Steel car axles	18.50 to 19.00
Iron car axles	21.00 to 21.50
Wrought iron bars and transoms	19.75 to 20.25
No. 1 railroad wrought	12.00 to 12.50
No. 2 railroad wrought	12.25 to 12.75
Cast iron borings	10.00 to 10.50
No. 1 busheling	10.75 to 11.25
No. 1 railroad cast	14.75 to 15.25
No. 1 machinery cast	17.00 to 17.50
Railroad malleable	13.00 to 13.25
Machine shop turnings	7.00 to 7.50
Bundled sheets	8.00 to 8.50

Buffalo

Heavier Demand for Pig Iron—Wire and Fabric Mills Run at Capacity

BUFFALO, Sept. 28.—Inquiry for pig iron has increased, and a good volume of buying is expected to develop in the next few weeks. One inquiry of 2000 tons of foundry for the fourth quarter is reported to have been issued by the Massey-Harris Harvester Co., Batavia, N. Y., and a Buffalo consumer wants 2000 tons of foundry for similar delivery. Another inquiry from the East is for 1300 to 1400 tons for the last quarter. First-quarter demand has come out more freely, and about 4000 tons altogether is sought for

that period. The General Electric Co., Schenectady, N. Y., is in the market for the October requirements of its Elmira, N. Y., plant, amounting to 800 to 1000 tons. Prices are steady in this district at $20, base Buffalo, with $19, base, being done on shipments to the East. A considerable amount of business is being entered by the furnaces in small lots. One maker booked totals of 600, 500 and 900 tons on separate days early last week, and similar tonnages during the remainder of the week.

We quote prices per gross ton, f.o.b. Buffalo, as follows:

No. 2 plain fdy., sil. 1.75 to 2.25	$19.00 to $20.00
No. 2X foundry, sil. 2.25 to 2.75	19.50 to 20.50
No. 1X foundry, sil. 2.75 to 3.25	20.50 to 21.50
Malleable, sil. up to 2.25	20.00
Basic	19.00
Lake Superior charcoal	29.28

Finished Iron and Steel.—Mill operations are good, and there is a satisfactory demand for most of the products that are made here. Bars and shapes are strong, and there is a good demand for plates. No large jobs have been awarded in the fabricated structural steel field, but many small ones have been placed. The situation in reinforcing bars is similar. Wire mills report an active demand. Preparations are being made by jobbers to put in liberal stocks of screen cloth and poultry netting. Wire and fabric mills are reporting running at 100 per cent. Sheet prices are strengthening. The base for No. 24 gage black sheets is $3, Pittsburgh, and 3.10c. is adhered to on the pickling grades. The price on No. 24 gage black sheets is said to be due for an advance to 3.10c. shortly. Inquiry is active and a local mill reports heavier bookings than at any time during the past six months. It is operating at 85 per cent of capacity. Warehouse business is reported excellent.

Old Material.—The market is quiet, but the consumption of scrap by the mills is heavy. Prices have eased off a little, and heavy melting steel, selected grade, is now quotable at $17.50 to $18. About the only thing that is sustaining the market is the buying by dealers against old orders. For ordinary heavy melting steel one mill is offering $16 and accepting small tonnages. The hydraulic compressed sheet market is very weak, with mills showing no interest whatever in that kind of scrap. Hydraulic compressed is now quotable at $14.50 to $15. No. 1 busheling is in fair demand, and dealers are busy covering. Stove plate and No. 1 cast are in fair demand, but the specialties market is off.

We quote prices per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	$16.00 to $16.50
Selected No. 1 heavy melting steel	17.50 to 18.00
Low phosphorus	18.50 to 19.00
No. 1 railroad wrought	15.00 to 15.50
Carwheels	17.00 to 17.50
Machine shop turnings	10.50 to 11.00
Mixed borings and turnings	12.00 to 12.50
Cast iron borings	12.50 to 13.00
No. 1 busheling	15.00 to 15.50
Stove plate	15.25 to 15.50
Grate bars	14.00 to 14.50
Hand bundled sheets	12.00 to 12.50
Hydraulic compressed	14.50 to 15.00
No. 1 machinery cast	16.00 to 16.25
Railroad malleable	16.50 to 17.00
Iron axles	24.00 to 25.00
Steel axles	16.00 to 16.50
Drop forge flashings	13.75 to 14.25

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and structural shapes	3.40c.
Mild steel bars	3.30c.
Cold-finished shapes	4.45c.
Rounds	3.95c.
No. 24 black sheets	4.30c.
No. 10 blue annealed sheets	3.80c.
No. 24 galvanized sheets	5.15c.
Common wire nails, base per keg	$3.90
Black wire, base per 100 lb	3.90

REINFORCING STEEL

Awards Are About 6700 Tons, Including 2500 for Staten Island Bridges

Concrete reinforcing steel awards during the week totaled close to 6700 tons, the largest letting being 2500 tons for Staten Island bridges. Most of the other awards were relatively small. Inquiries aggregate 7500 tons, among which are two of 2000 tons or more and one of 1200 tons. Awards follow:

NEW YORK, 2500 tons, approaches for bridges from Tottenville, S. I., to Perth Amboy, N. J., and from Howland Hook, S. I., to Elizabethport, N. J., from Frederick Snare Corporation, general contractor, to E. T. Edwards, Columbia, Pa.

NEW YORK, 200 tons, building for Manhattan Foundry Co., to Igoe Brothers.

ALBANY, 100 tons, Admiral Hotel, to Kalman Steel Co.

PHILADELPHIA, 700 tons, junior high school at Sixteenth and Wood Streets, to American Steel Engineering Co.

PITTSBURGH, 100 tons, dormitory, Mount Mercy Academy, to Carlem Engineering Co.

PITTSBURGH, 75 tons, warehouse for Hasley Brothers Transfer & Storage Co., to Carlem Engineering Co.

HAMILTON, Ohio, 140 tons, Hamilton Community Hotel, to Pollak Steel Co.

CINCINNATI, 230 tons, Chamber of Commerce, to Pollak Steel Co.

DETROIT, 250 tons, building for Westinghouse Electric & Mfg. Co., to Pollak Steel Co.

DETROIT, 400 tons, Fort Shelby Hotel, to McRae Steel Co.

DETROIT, 100 tons, addition to Chrysler Motor plant, to McRae Steel Co.

DETROIT, 100 tons, Hopcroft Garage, to McRae Steel Co.

DETROIT, 100 tons, power house for Kiefer Hospital, to McRae Steel Co.

CHICAGO, 100 tons, Rosen Dairy Co., to Kalman Steel Co.

CHICAGO, 150 tons of rail steel, addition for Columbia Colortype Co., to Olney J. Dean & Co.

CHICAGO, 170 tons, public school at Kilbourne and George Streets, to Olney J. Dean & Co.

CHICAGO, 250 tons of rail steel, addition to White Sox Ball Park, to Calumet Steel Co.

CHICAGO, 130 tons of rail steel, Union League Boy's Club, to Calumet Steel Co.

ST. LOUIS, 200 tons, addition to Vesper-Buick Auto Co. service station, to Laclede Steel Co.

FAIRFIELD, MONT., 450 tons, Gibson dam at Fairfield, to unnamed firm, Utah Construction Co., general contractor.

HAYWARD, CAL., 100 tons, bridge across San Lorenzo Creek at Hayward, to Badt-Falk & Co., San Francisco.

LOS GATOS, CAL., 150 tons, Roman Catholic Novitiate, to W. S. Wetenhall Co., San Francisco.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

BOSTON, 2000 tons, candy factory.

NEW YORK, 160 tons, Neptune Warehouse, Bronx; general contract not let.

PHILADELPHIA, 530 tons, Fern Rock shops for Philadelphia subway system.

BALTIMORE, 350 tons, Motor Ramp Garage.

CINCINNATI, 1200 tons, sections 4, 5 and 6 of Central Parkway for Cincinnati Rapid Transit Commission; bids in.

NEWPORT, KY., 120 tons, Newport high school; bids in.

MILWAUKEE, 130 tons, Holy Angel high school; general contractor W. W. Oelfein.

SPRINGFIELD, ILL., tonnage being estimated, stadium for State fair grounds.

CHICAGO, 750 tons, apartment building at Ainslee and Lake Streets; Morris L. Dein, architect.

SAN CARLOS, ARIZ., 2250 tons, Coolidge Dam near San Carlos for Bureau of Indian Affairs, Department of Interior; bids to be called soon at Los Angeles.

Federal Trade Commission Restrained from Getting Association Records

WASHINGTON, Sept. 28.—Efforts of the Federal Trade Commission to try unduly to pry into private business have again met with judicial restraint. In a vigorous decision, handed down last week, the Supreme Court of the District of Columbia, speaking through Associate Justice Smith, held that the Millers' National Federation of Chicago is entitled to a restraining order against the commission to prevent the execution of subpoenas calling for the production of books, records and papers of the federation.

The commission had sought to obtain these documents of the federation in connection with the commission's proposed investigation of the milling and baking industries, ordered by a Senate resolution.

It was maintained that a trade association in fact is not engaged in commerce and therefore can not be made to yield to the demands of the commission.

FABRICATED STRUCTURAL STEEL

Awards Close to 30,000 Tons—Largest Job Is 8000 Tons for Chicago—Inquiries 17,000 Tons

Structural steel bookings for September probably will show a falling off from some of the preceding active months of the year, but the total for the past week, 30,000 tons, was fairly good considering the approach of winter and the fact that some fabricating shops cannot promise deliveries until the late fall. New projects up for bids total about 17,000 tons. Awards follow:

NEWTON, MASS., 150 tons, convent, to New England Structural Co.

ARLINGTON, MASS., 100 tons, Arlington Gas Light Co., to New England Structural Co.

BOSTON, 150 tons, roof, Boston College library, to New England Structural Co.

WHITE PLAINS, N. Y., 250 tons, service station, Westchester Lighting Co., to American Bridge Co.

NEW YORK, 3000 tons, hotel, Fifty-ninth Street and Park Avenue, to Taylor-Fichter Steel Construction Co.

NEW YORK, 1500 tons, Paterno apartment hotel, 825 Fifth Avenue, to Easton Structural Steel Co.

NEW YORK, 1000 tons, apartment building, Sixty-fourth Street, to Paterson Bridge Co.

NEW YORK, 950 tons, section of subway, to Bethlehem Steel Bridge Construction Co.

NEW YORK, 600 tons, apartment building, Seventieth Street and Madison Avenue, to Paterson Bridge Co.

NEW YORK, 300 tons, administration building, New York-New Jersey Tunnel Commission, Watt and Varick Streets, to Bethlehem Fabricators, Inc.

NEW YORK, 250 tons, apartment building, 68 Park Avenue, to Hinkle Steel Construction Co.

BROOKLYN, 400 tons, warehouse, to George A. Just Co.

GLEN COVE, L. I., 150 tons, theater, to Hinkle Steel Construction Co.

PENNSYLVANIA RAILROAD, 800 tons, catenary bridges for electrification of line between Philadelphia and Wilmington, Del., to Belmont Iron Works.

PENNSYLVANIA RAILROAD, 100 tons, two turntables, to American Bridge Co.

PHILADELPHIA, 2600 tons, Fern Rock shops for Philadelphia subway system, to Phoenix Bridge Co.

PORTO RICO, 100 tons, tank, to Pittsburgh-Des Moines Steel Co.

BUFFALO, 156 tons, American Radiator Co., to Pittsburgh-Des Moines Steel Co.

PITTSBURGH, 3000 tons, Clark Building, to American Bridge Co.

CREIGHTON, PA., 400 tons, Pittsburgh Plate Glass Co., to Pittsburgh Bridge & Iron Co.

MORGANTOWN, W. VA., 500 tons, bridge, to Pittsburgh-Des Moines Steel Co.

LOUISVILLE, KY., 340 tons, four docks for E. T. Slider Co., New Albany, Ind., to Howard Shipyard & Dock Co., Jeffersonville, Ind.

MANSFIELD, OHIO, 500 tons, administration building, Ohio Brass Co., general contract to Hossler Brothers, Tiffin, Ohio.

CHICAGO, 8000 tons, Pittsfield building, to McClintic-Marshall Co.

CHICAGO, 120 tons, office building, to Aztec Iron Works, Chicago.

CHICAGO, 1025 tons, extension to White Sox Ball Park, to Duffin Iron Co., Chicago.

CHICAGO, 200 tons, column relocation for Chicago Rapid Transit Co., to Hansell Elcock Co.

INTERNATIONAL FALLS, MINN., 250 tons, Minnesota & Ontario Paper Co., to Minneapolis Steel & Machinery Co.

ST. LOUIS, 312 tons, tank for Ozark Pipe Line Co., to Pittsburgh-Des Moines Steel Co.

LEWISTON, IDAHO, 750 tons, storage shed for Clearwater Lumber Co., to Pittsburgh-Des Moines Steel Co.

MARTINEZ, CAL., 200 tons, tank work for the Shell Oil Co., to Western Pipe & Steel Co.

SANTA BARBARA, CAL., 260 tons, municipal pipe line, to Western Pipe & Steel Co.

LOS ANGELES, 110 tons, La Bolona School, to Moore Dry Dock Co.

SAN FRANCISCO, 157 tons, apartment building, Clay and Gough Streets, to Western Iron Works.

SAN FRANCISCO, 125 tons, apartment building, Turk and Hyde Streets, to Central Iron Works.

SAN FRANCISCO, 1000 tons, hulls for two ferry-boats for the Southern Pacific Co., to Bethlehem Shipbuilding Corporation.

Structural Projects Pending

Inquiries for fabricated steel work include the following:

PROVIDENCE, R. I., 1400 tons, Masonic Temple.

BOSTON, 110 tons, Singer Sewing Machine Co., Temple Place, office building.

BOSTON, 1500 tons, one railroad bridge and two highway bridges for the State of Massachusetts.

ALBANY, N. Y., 700 tons, Knickerbocker Press Building.

NEW YORK, 1650 tons, section of subway, Route 8.

NEW BRUNSWICK, N. J., 400 tons, hospital.

PHILADELPHIA, 400 tons, addition to plant of Philadelphia Gear Works.

PHILADELPHIA, 600 tons, retail store for Sears, Roebuck & Co.

PHILADELPHIA, 175 tons, Ridge Avenue bridge for Reading Railroad; general contract awarded.

PHILADELPHIA, 125 tons, Leverington Presbyterian Church.

ATLANTIC CITY, N. J., 900 tons, James Madison Hotel.

SALEM, N. J., 700 tons, bascule bridge over Penn's Neck.

CLEVELAND, 500 tons, Phyllis Wheatley Home.

BALTIMORE, 300 tons, highway bridge.

PITTSBURGH, 500 tons, theater.

CHICAGO, 1400 tons, apartment building at 2430 Lakeview Avenue.

CHICAGO, 3500 tons, Woodlawn Theater and hotel.

CINCINNATI, 300 tons, E. Kahn Packing Co.

BIG FOUR RAILROAD, 100 tons, turntable; bids close Oct. 4.

SAN CARLOS, ARIZ., 700 tons, Coolidge Dam, near San Carlos, for Bureau of Indian Affairs, Department of Interior; bids to be called at Los Angeles, Cal.

PITTSBURG, CAL., 225 tons, buildings for the Pioneer Rubber Co.; bids in.

SAN FRANCISCO, 500 tons, apartment building, Greenwich Street; bids in.

SAN FRANCISCO, 200 tons, plates for Manila, P. I.; bids to be taken by the Atlantic, Gulf & Pacific Co., San Francisco.

RAILROAD EQUIPMENT

Chicago, Milwaukee & St. Paul and Louisville & Nashville Each to Buy 1500 Cars

The Chicago, Milwaukee & St. Paul has inquired for 1000 automobile and 500 stock cars and the Louisville & Nashville has been authorized to purchase 1500 freight cars, 28 passenger cars and 18 locomotives. The Missouri Pacific is expected in the market for 3500 cars, and other railroad inquiries are looked for soon. Details of the week's developments follow:

The Chicago, Milwaukee & St. Paul is in the market for 1000 automobile and 500 stock cars.

The Missouri Pacific has placed 1000 refrigerator cars with the American Car & Foundry Co. and 1000 with the General American Car Co. The same railroad is expected to issue an inquiry shortly for about 3500 freight cars.

The Louisville & Nashville board of directors has authorized the purchase of 1500 freight cars, 28 passenger cars and 18 locomotives.

The Delaware, Lackawanna & Western is said to have prepared a car buying program and its inquiry for about 2000 cars is expected soon.

The Koppers Construction Co. has ordered 100 mine cars from the Koppel Industrial Car & Equipment Co.

The Burlington Refrigerator Express is inquiring for 200 steel underframes and 200 center sills.

The Norfolk Southern is in the market for 100 composite gondola cars.

The Pennsylvania Coal Co. is inquiring for 50 mine cars.

The Pacific Fruit Express is in the market for 500 underframes.

Reorganize Scullin Steel Co.

ST. LOUIS, Sept. 28.—A reorganization of the Scullin Steel Co. to liquidate the holdings of the estate of John Scullin in the properties has been announced by a group of brokers, who will purchase the company for $10,000,000 and resell control to Harry Scullin, president and general manager for the last 27 years. The company has outstanding common stock of a par value of $1,500,000 and $1,471,600 preferred stock, which will be recalled at $110.

Originally incorporated as the Scullin Gallagher Iron & Steel Co., July 7, 1889, the name was changed to the Scullin Steel Co. in 1919. The company operates 11 open-hearth furnaces and rolling mills.

NON-FERROUS METAL MARKETS

The Week's Prices

Cents per Pound for Early Delivery

	Sept. 28	Sept. 27	Sept. 25	Sept. 24	Sept. 23	Sept. 22
Lake copper, New York	14.50	14.50	14.50	14.50	14.50	14.50
Electrolytic copper, N. Y.*	14.00	14.00	14.00	14.00	14.00	14.00
Straits tin, spot, New York	71.00	70.37½	....	69.25	69.50	69.05
Lead, New York	8.75	8.75	8.75	8.75	8.75	8.75
Lead, St. Louis	8.40	8.40	8.45	8.45	8.45	8.45
Zinc, New York	7.70	7.70	7.72½	7.72½	7.72½	7.72½
Zinc, St. Louis	7.35	7.35	7.37½	7.37½	7.37½	7.37½

*Refinery quotation; delivered price ¼c. higher.

NEW YORK, Sept. 28.—Copper is quiet, and prices are slightly easier. Tin is strong, but sales were less in volume than in the preceding week. Lead has been in better demand, with prices sagging. Zinc is quiet, with quotations also lower. Antimony has again declined.

Copper.—There were sales of 5000 or 6000 tons of copper one day last week, but since then the market has been exceedingly quiet. Prices throughout the week have been on the basis of 14.25c., delivered Connecticut Valley, for electrolytic. There is a fairly firm undertone, which has been helped somewhat by higher prices in London.

Tin.—With sales totaling considerably less than those of the preceding week, the tin market held its strength during the past week, prices ranging from 69.05c. to 71c. per lb., which was today's closing quotation. In the calendar week sales were about 1200 tons. About the middle of last week there was a determined effort on the part of some dealers to depress the market, which they did by offering tin for later delivery, January especially, at prices lower than prevail for deliveries nearer by. When real buyers came along, however, some of the dealers ran to cover and very little business was consummated at the figures quoted. Spot tin is very scarce and in good demand. The farther off the delivery, the lower the price. For example: 71c. was today's price for spot tin, while for the first half of October 70.50c. was quoted, 70c. for all of October, 69.50c. for early November, 68.25c. for all of November, and 67.75c. for all of December. Only a few parcels were available this week for prompt shipment, while the supply for October is also tight. The explanation for the unusually strong market is that tin is not being produced in large enough quantities to provide for the very heavy consumption in the United States this year. London prices today were: Spot standard, £313 10s.; future standard, £302 15s.; spot Straits, £321; Singapore, £309 5s.

Lead.—Fairly large sales of lead were made on one or two days last week, but the market is spotty, and on other days there was very little business done. The price of the American Smelting & Refining Co. continues at 8.75c., New York, the same as in the preceding week, but at St. Louis quotations have been a little easier, ranging from 8.40c. to 8.45c., the price on Monday and Tuesday of this week being 8.40c.

Zinc.—Anxiety on the part of some sellers to put more orders on their books has resulted in slight weakness in zinc prices, despite the fact that a fair amount of business was done. During the latter part of last week sales were made at 7.37½c., St. Louis, while this week zinc has been available at 7.35c.

Antimony.—Further weakness in antimony, due largely to oversupply and lack of demand, has brought prices down to 14.25c. for spot and 13.50c. for future delivery, duty paid, at New York.

Nickel.—Prices are unchanged, with ingot nickel at 35c. per lb. and shot nickel at 36c. per lb. Electrolytic is quoted at 39c.

Aluminum.—Virgin ingot aluminum is quoted at 27c. per lb. for delivery over the remainder of the year.

Non-Ferrous Metals at Chicago

SEPT. 28.—Demand is fair, but prices are easier. The consumption of copper is large, but the available supply is growing as compared to the demand, and prices are lower than a week ago. Antimony is inactive, and the price is nominal. The used metal market is dull.

We quote, in carload lots, Lake copper, 14.50c.; tin,

Metals from New York Warehouse

Delivered Prices per Lb.

Tin, Straits pig	72.50c. to 73.50c.
Tin, bar	73.00c. to 73.50c.
Copper, Lake	15.50c.
Copper, electrolytic	15.25c.
Copper, casting	14.75c.
Zinc, slab	8.50c. to 9.00c.
Lead, American pig	9.25c. to 9.75c.
Lead, bar	11.50c. to 12.50c.
Antimony, Asiatic	17.00c. to 18.00c.
Aluminum, No. 1 ingot for remelting (guaranteed over 99 per cent pure)	30.00c. to 30.50c.
Babbitt metal, commercial grade	30.00c. to 40.00c.
Solder, ½ and ½	42.50c. to 43.50c.

Metals from Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	74.50c.
Tin, bar	76.50c.
Copper, Lake	15.00c.
Copper, electrolytic	15.00c.
Copper, casting	14.00c.
Zinc, slab	8.50c.
Lead, American pig	9.60c.
Antimony, Asiatic	20.50c.
Lead, bar	11.50c.
Babbitt metal, medium grade	22.50c.
Babbitt metal, high grade	79.50c.
Solder, ½ and ½	44.50c.

Rolled Metals from New York or Cleveland Warehouse

Delivered Prices, Base per Lb.

Sheets—	
High brass	19.37½c. to 20.37½c.
Copper, hot rolled	23.00c. to 24.00c.
Copper, cold rolled, 14 oz. and heavier	25.25c. to 26.25c.
Seamless Tubes—	
Brass	24.25c. to 25.25c.
Copper	25.00c. to 26.00c.
Brazed Brass Tubes	27.37½c. to 28.37½c.
Brass Rods	17.12½c. to 18.12½c.

From New York Warehouse

Delivered Prices, Base per Lb.

Zinc sheets (No. 9), casks	13.00c. to 13.25c.
Zinc sheets, open	13.50c. to 13.75c.

Non-Ferrous Rolled Products

Mill prices on bronze, brass and copper products, zinc sheets and lead full sheets have remained the same for two months.

On Copper and Brass Products, Freight up to 75c. Per 100 Lb. Allowed on Shipments of 500 Lb. or Over

Sheets—	
High brass	19.37½c.
Copper, hot rolled	23.00c.
Zinc	11.75c.
Lead (full sheets)	12.50c. to 12.75c.
Seamless Tubes—	
High brass	24.25c.
Copper	25.00c.
Rods—	
High brass	17.12½c.
Naval brass	19.87½c.
Wire—	
Copper	16.37½c.
High brass	19.87½c.
Copper in Rolls	21.87½c.
Brazed Brass Tubing	27.37½c.

Aluminum Products in Ton Lots

The carload freight rate is allowed to destinations east of the Mississippi River and also allowed to St. Louis on shipments to destinations west of that river.

Sheets, 0 to 10 gage, 3 to 30 in. wide	37.50c.
Tubes, base	48.00c.
Machine rods	34.00c.

Rolled Metals, f.o.b. Chicago Warehouse

(Prices Cover Trucking to Customers' Doors in City Limits)

	Base per Lb.
Sheets—	
High brass	19⅝c. to 20⅝c.
Copper, hot rolled	23c.
Copper, cold rolled, 14 oz. and heavier	25¼c.
Zinc	12.25c.
Lead, wide	11.25c.
Seamless Tubes—	
Brass	24¼c.
Copper	25c.
Brazed Brass Tubes	27⅝c.
Brass Rods	17⅛c.

Old Metals, Per Pound, New York

The buying prices represent what large dealers are paying for miscellaneous lots from the smaller accumulators, and the selling prices are those charged consumers after the metal has been properly prepared for their uses.

	Dealers' Buying Prices	Dealers Selling Prices
Copper, heavy crucible	12.00c.	13.50c.
Copper, heavy and wire	11.75c.	12.50c.
Copper, light and bottoms	9.75c.	11.25c.
Brass, heavy	7.25c.	9.00c.
Brass, light	6.25c.	8.00c.
Heavy machine composition	8.75c.	10.125c.
No. 1 yellow brass turnings	8.50c.	9.25c.
No. 1 red brass or composition turnings	8.25c.	9.25c.
Lead, heavy	7.25c.	7.75c.
Lead, tea	5.50c.	6.25c.
Zinc	4.25c.	4.75c.
Sheet aluminum	17.00c.	19.00c.
Cast aluminum	17.00c.	19.00c.

70.50c.; lead, 8.50c.; zinc, 7.45c.; in less than carload lots, antimony, 16.50c. On old metals we quote copper wire, crucible shapes and copper clips, 10.75c.; copper bottoms, 9.75c.; red brass, 9.25c.; yellow brass, 8c.; lead pipe, 7.50c.; zinc, 5c.; pewter, No. 1, 35c.; tin foil, 43.50c.; block tin, 52c.; aluminum, 17.75c.; all being dealers' prices for less than carload lots.

FOUNDRY CONGRESS

Meeting and Exhibition at Detroit Another Record—No Foundry Show in 1927

DETROIT, Sept. 28.—The largest and most interesting gathering of foundrymen in the history of the American industry is assembled here this week. The thirtieth annual convention and exhibition of the American Foundrymen's Association and the second International Foundry Congress got under way yesterday under most auspicious conditions. The attendance exceeds optimistic predictions. Registration on the first day of over 2300 compares with 2980 for the entire week last year at Syracuse, so that this year's record will eclipse that of any other.

The official opening of the international congress took place yesterday afternoon in the Coliseum at the State Fair Grounds. Over 90 visiting foreign foundrymen arrived by boat from the East, after visiting Philadelphia and Buffalo. The representatives of 10 different countries, as well as all the foreign visitors, were officially welcomed by A. B. Root, Jr., president of the A. F. A., and others, on behalf of Detroit and the State of Michigan. Today a French session is being held, with one in German scheduled for tomorrow. Many of the foreigners are attending technical sessions and participating in the discussions.

An extensive technical program of 24 sessions is being smoothly carried out. Features are symposiums on permanent molds and temperature control in foundries. The meetings are all attracting a large attendance.

The foundry and equipment exhibition is both imposing and large. The 82,000 sq. ft. occupied by booths makes it the most extensive ever held. It is located in three large buildings of the Michigan State Fair Grounds, eight miles from the city's hotel center. The displays of operating equipment are particularly fine.

Next Exhibition in Spring of 1928

Announcement will be made Thursday at the annual meeting that the board of directors at its meeting here decided to return to the spring of the year for future conventions and exhibitions. In the spring of 1927 only a technical convention will be held, with an exhibition and a technical convention in the spring of 1928. Visiting foundrymen from Germany are indicating that the third international foundrymen's congress will be invited to Duesseldorf in 1929.

The sudden death of George K. Elliott, chief metallurgist Lunkenheimer Co., Cincinnati, has been a shock to his many friends here. He was prominent in this organization and was to be present to deliver a paper, as well as preside at a round table discussion on brass foundry problems of the Institute of Metals, which is holding several successful sessions concurrently.

S. W. Utley for President

For president for the ensuing year, S. William Utley, vice-president Detroit Steel Casting Co., Detroit, has been nominated with S. T. Johnston, vice-president S. Obermayer Co., Chicago, selected for vice-president.

Last Week's Tour of Foreign Foundry Heads

European foundrymen, numbering about 100 or more, reached Detroit for the convention of the American Foundrymen's Association and the second International Foundry Congress after a trip which included Philadelphia, Buffalo and Niagara Falls.

Leaving New York Wednesday morning, Sept. 22, the party arrived in Philadelphia at noon and was quartered at the Hotel Benjamin Franklin, where it remained until the time of departure for Buffalo on Friday morning. Wednesday the visitors were taken in special buses to the Sesqui-Centennial Exposition, where they spent the afternoon.

In the evening a dinner was given for them at the Manufacturers' Club. The dinner was presided over by Stanley G. Flagg, Jr., general chairman of the Philadelphia reception committee. Addresses were delivered by Walter Wood, president Philadelphia Foundrymen's Association; Mayor W. Freeland Kendrick; Charles Lyon Chandler, Corn Exchange National Bank; Dr. Edward J. Cattell. The spirit of brotherly love and the broader spirit of international amity were the themes of most of the addresses, and "shop talk" was generally omitted for the evening.

On Thursday the visitors had plenty of opportunity for "shop talk," for they visited the plants of the Autocar Co., Baldwin Locomotive Works, Westinghouse Electric & Mfg. Co., and the United States Navy Yard at League Island. For those who did not wish to take this trip, but were interested in manufacturing, facilities were provided for visiting other plants.

Bookings and Production of Commercial Steel Castings

WASHINGTON, Sept. 28.—Production of commercial steel castings in August totaled 79,002 tons, or 61 per cent of the capacity of 128,470 tons of the 108 reporting concerns, according to the Department of Commerce. This compares with an output of 85,338 tons in July. Of the August production, 25,783 tons were for railroad specialties, representing 44 per cent of this class of capacity, while 53,219 tons consisted of miscellaneous castings, being 77 per cent of this class of capacity.

Bookings in August amounted to 65,622 tons or 51 per cent of capacity as against 74,430 tons, or 57 per cent of capacity, in July. Of the August bookings, 22,773 tons were for railroad work and 42,849 tons for miscellaneous uses.

Production during the first eight months aggregated 749,918, while bookings totaled 677,849 tons. For the corresponding period of last year, bookings were 583,309 tons.

PERSONAL

Col. Leonard S. Horner, until recently vice-president and manager of sales for the Acme Wire Co., New Haven, Conn., has been elected president of the Niles-Bement-Pond Co., New York, to succeed James K. Cullen, who resigned Sept. 21 in order to devote his entire time to his activities as president and general manager of the Niles Tool Works Co., Hamilton, Ohio. Col. Horner was graduated in electrical engineering from Lehigh University in 1898, and served for a time as construction engineer for the American Telephone & Telegraph Co. He was later electrical engineer and sales manager for the Crocker-Wheeler Co., Ampere, N. J., joining the Acme Wire Co. in 1908. He has continued as a director of the Crocker-Wheeler Co. and will also remain as a director of the Acme company. He saw service in the Spanish-American War, and during the World War was commissioned major, being placed in charge of the manufacturing facilities and production of Liberty engines, airplanes, airplane machine guns and other airplane accessories. After serving in this capacity for eight months he was made lieutenant-colonel and chief of the staff to the commanding officer of aircraft production. His efforts in the production of Liberty motors and airplanes resulted in his being cited for meritorious service by the British government. He is a director of the Pratt & Whitney Aircraft Co., Hartford, Conn., vice-president of the New Haven Chamber of Commerce, a counsellor of the United States Chamber of Commerce and a member of the Board of Aviation.

COL. L. S. HORNER

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R. J. Elliott, formerly purchasing agent in the St. Paul district of the Northern Pacific Railway, has been appointed director of purchases for the entire road with headquarters in St. Paul. His place has been filled by C. C. Kyle, formerly general storekeeper for the Northern Pacific.

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B. O. Leftwich has been appointed representative in southwestern United States and northern Mexico for the Atlas Car & Mfg. Co., Cleveland, with headquarters at Phoenix, Ariz.

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B. H. Rhynearson and B. F. Blackwell, both formerly of the Carle Machinery Co., Indianapolis and Detroit, have opened offices at 541 Illinois Building, Indianapolis, and will deal in new and used tools and factory equipment.

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I. Edmund Waechter has resigned his position as metallurgical engineer for the General Chemical Co., 40 Rector Street, New York, to become a consulting metallurgical and chemical engineer with headquarters at Tampa, Fla.

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Carl G. Schluederberg has been appointed general manager George Cutter Co., South Bend, Ind., a subsidiary of the Westinghouse Electric & Mfg. Co. He will be in charge of sales, engineering and manufacturing. He succeeds Warren Ripple, vice-president and treasurer, who has resigned on account of ill health. Mr. Schluederberg, who has been assistant to the managers of both the supply and merchandising departments, recently was director of the company's exhibit at the Sesquicentennial Exposition in Philadelphia. He was born in Pittsburgh, was graduated from Cornell University in 1902 with degrees in mechanical and electrical engineering and, after a three-year interval, returned for postgraduate work in electrochemistry. In 1908 he received his doctor of philosophy degree from Cornell. Except for a period of about two years when he served as a metallurgical engineer with the Carnegie Steel Co., Pittsburgh, and as electrical and mechanical engineer with the United Coal Co., he has been with the Westinghouse company continuously since 1902. He is a member of the National Electric Light Association, the American Institute of Electrical Engineers, American Chemical Society and American Electrochemical Society, being a director, a past president and former chairman of the Pittsburgh section of the latter organization.

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R. E. Prussing, for many years district sales manager at Detroit for the Whiting Corporation, Harvey, Ill., has been removed to the company's main office. He will be succeeded at Detroit by W. R. Hans, for the last two years Buffalo district manager for the Whiting Corporation, and sales in the Buffalo territory will hereafter be handled by C. G. Crewson and Arthur E. Smith of the Industrial Equipment Co., 306 Jackson Building, Buffalo.

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George T. Kimball, president American Hardware Corporation, New Britain, Conn., spoke last week on the Connecticut Water Commission before the New Britain Kiwanis Club.

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David Hale, president Springfield Foundry Co., Springfield, Mass., has returned from an extended visit in Europe.

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G. E. Stoltz, recently appointed manager of industrial engineering, Westinghouse Electric & Mfg. Co., has been associated with that company since his graduation from Ohio State University in 1909. After completing the apprentice course of the company, he entered the steel mill section of the general engineering department, and was head of that section at the time of his recent promotion. He placed in operation the first alternating current adjustable speed set on this continent, and also assisted in placing in operation the early reversing blooming mill equipments. He cooperated in the design of the recent single unit reversing equipments. Mr. Stoltz is a member of the American Iron and Steel Institute, the Association of Iron and Steel Electrical Engineers, American Institute of Electrical Engineers and the Engineering Society of Western Pennsylvania, and has delivered a number of talks and papers before these various organizations.

G. E. STOLTZ

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Carlton Jackson, New York, has been appointed Commercial Attaché, Department of Commerce, at Rio de Janeiro, succeeding W. L. Schurz.

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William H. Frannagan, purchasing agent Howe Scale Co., Rutland, Vt., has resigned to become associated with the F. R. Patch Mfg. Co. of that city. A. N. Lyons is now purchasing agent for the Howe company.

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W. H. Eisenman, secretary of the American Society for Steel Treating, has been granted a leave by the directors of the society in order that he may make a European trip. He probably will leave in October.

Edward F. Feely has resigned from the service of the Department of Commerce, and will leave for Ecuador and Bolivia on Oct. 7 as a member of Professor Kemmerer's financial commission to those countries.

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H. O. Smith, New York, has been appointed chief of the automotive division of the United States Department of Commerce to succeed Percy Owens who resigned recently to become export manager for Dodge Brothers, Inc.

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Kenneth L. Clark, formerly with Henry Disston & Sons, Philadelphia, has been appointed supervisor of sales for the Kinite Corporation, Milwaukee, maker of die steel, in Michigan, Illinois, Indiana, Iowa and a portion of Missouri. R. H. Herbst, formerly in the Milwaukee office of the company, has been placed in charge of its Detroit office at 233 General Motors Building. P. L. Getzinger, with offices at 709 First National Bank Building, will represent the company in the Chicago territory.

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Owen R. Rice has resigned as assistant blast furnace superintendent of the Maryland Plant, Bethlehem Steel Corporation, to become associated with Freyn Engineering Co., Chicago. He was graduated in chemical engineering from Lehigh University in 1917 and immediately afterward entered the employ of the Bethlehem company as blast furnace metallurgical assistant, serving in that capacity for three years. Among his later duties was the conducting of a school of instruction in coke oven operation. In his new connection with the Freyn Engineering Co., Mr. Rice will assist Mr. Willcox in blast furnace and metallurgical matters.

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E. L. Becker, advertising manager Newport Rolling Mill Co. and Andrews Steel Co., Newport, Ky., has been appointed instructor in the College of Commerce at the University of Cincinnati, and will conduct a course in advertising during the coming year.

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John Warner, district sales manager in Cincinnati for the Ashland By-Product Coke Co., Ashland, Ky., has been transferred to the New York office of the Semet-Solvay Corporation, of which the former is a subsidiary. He has been succeeded by John Daker, district sales manager in Cleveland for the Ashland company, who will have charge of both the Cleveland and Cincinnati offices.

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P. D. Mackey has been appointed general superintendent of the Phoenix Horseshoe Co., Cleves, Ohio. He has been identified during the past year with the company's New York office.

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L. T. Pockman, for the past ten years district manager in Los Angeles for the Chicago Pneumatic Tool Co., New York, has been appointed manager of Pacific Coast sales with headquarters in Los Angeles.

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J. C. Wicks has resigned as Cleveland district sales representative of the Thomas Sheet Steel Co., Niles, Ohio, and the Central Iron & Steel Co., Harrisburg, Pa., and discontinued the sales office which he operated under the name of the J. C. Wicks Co. to engage in the distribution of advertising mirrors in Cleveland under the name of the Mirror Advertising Co. Mr. Wicks has been engaged in the sheet steel industry in Ohio since 1903, practically all that time in the sales department. He was sales manager of the Garry Iron & Steel Co., Niles, Ohio, until its consolidation with the Brier Hill Steel Co., Youngstown, and was sales manager of the latter company until it was taken over by the Youngstown Sheet & Tube Co. in 1923.

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L. S. Harding, for several years employment manager and director of training for the Worthington Pump & Machinery Corporation, East Cambridge, Mass., has been appointed industrial training adviser for the Associated Industries of Massachusetts, whose offices are at 31 St. James Avenue, Boston. Besides assuming his new duties he will continue his activities with the Worthington Pump & Machinery Corporation as heretofore. This arrangement will result in extending Mr. Harding's services in developing apprentice training programs, planning foreman training projects and in the general problem of industrial education to a much larger field.

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Charles S. Churchill, vice-president Norfolk & Western Railway, retires from active service on Sept. 30, after nearly 40 years with the company, having reached the age limit of 70 years. Mr. Churchill has had charge for many years of purchases, real estate and valuation of the Norfolk & Western. Steel men who have shared in the activities of the American Society for Testing Materials will recall Mr. Churchill's participation in the important rail discussions of the society 15 to 20 years ago. His college work in civil engineering was taken at Yale and in his earlier railroad career he had a variety of experience in location and construction, including connections with the Pittsburgh, McKeesport & Youghiogheny and the Schuylkill Valley line of the Pennsylvania Railroad. From 1903 to 1913 he was chief engineer of the Norfolk & Western. He was chairman of the rail committee of the American Railway Engineering Association from 1909 to 1913. Revolutions have come in railroad construction, maintenance and operation in Mr. Churchill's career. In 1888 the Norfolk & Western had in operation approximately 540 miles of 52 and 56-lb. rails; in 1913 there were 2025 miles of 85 and 100-lb. rails, and today approximately 2240 miles equipped with 100 and 130-lb. rails. The weights of locomotives have increased from 107,300 lb. in 1888 to 360,750 lb. in 1913, and today the weight is approximately 531,000 lb. The tonnage hauled in 1888 was 2,800,000 tons; in 1913, approximately 44,000,000 tons, and in 1925, 50,275,000 tons.

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William Smith, until recently sales manager Falcon Bronze Co., Youngstown, has joined the Lawrenceville Bronze Co., Pittsburgh, in the same capacity. For a number of years he was associated with the New Process Copper Castings Co., Pittsburgh, and previously was in the blast furnace department, Bethlehem Steel Co., Steelton, Pa.

Management Association to Meet in Cleveland

The American Management Association will hold its autumn convention at Hotel Statler, Cleveland, Oct. 11, 12 and 13. Trends in methods of distribution will be discussed on Oct. 11, and among the papers to be read will be one on "Industrial Selling" by L. C. Rockhill, general sales manager Goodyear Tire & Rubber Co., Akron, Ohio, and another on "Selling Through the Jobber" by H. W. Prentis, Jr., vice-president and general sales manager, linoleum division, Armstrong Cork Co., Lancaster, Pa. A simultaneous session for office executives will be held on the same day. Budgeting technique will be the subject for discussion on Oct. 12.

On Wednesday morning, Oct. 13, a committee, of which Arthur H. Young, Industrial Relations Counselors, Inc., New York, is chairman, will report on "Lessons for Business from the Organization of the General Staff of the Army." The report will be presented by Dr. C. R. Mann, chairman civilian advisory board, War Department. In the afternoon there will be a session on management's contribution to national welfare. "Handling Employment in a Period of Declining Business" will be discussed by Katharine Huey, employment department, Kodak Park Works, Eastman Kodak Co., Rochester, N. Y. "Pre-retirement Disposition of Older Employees" will be the subject of a paper by Bennet F. Schauffler, employment manager, Philadelphia Rapid Transit Co.

The fifth annual convention of the American Construction Council, Franklin D. Roosevelt, president, will be held at the Hotel Cleveland, Cleveland, on Nov. 8, 9 and 10.

OBITUARY

GEORGE K. ELLIOTT, chief chemist and metallurgist for the Lunkenheimer Co., Cincinnati, died Sept. 23 at Christ Hospital in that city. He was born at Sidney, Ohio, in 1880, and was graduated from the University of Cincinnati in 1903. Following his graduation he spent a year as head of the natural science department of the Cincinnati Technical School, but has been identified continuously with the Lunkenheimer Co. since 1904. He has been active in research work with both ferrous and non-ferrous metals and alloys, especially as concerns their foundry treatment and their application to modern power plant appliances handling steam. He performed much original work in the application of the electric furnace to the founding of malleable and gray iron and was the first to use the duplex or cupola and electric furnace process for gray iron for castings. He was the author of the first exchange paper, "The Basic-Hearth Electric Furnace and Some Problems of Cast Iron," before the Institute of British Foundrymen, and had written a number of books and articles on the various phases of electric furnace operation. He was a former chairman of the Institute of Metals Division of the American Society for Testing Materials, a past vice-president of the American Electrochemical Society and a member of the American Society of Mining and Metallurgical Engineers, the American Chemical Society, the Society of Automotive Engineers and the London Society of Chemical Industry. Mr. Elliott was scheduled to deliver a paper on Wednesday of this week at the International Foundry Congress at Detroit, on a shearing test for cast iron.

GEORGE K. ELLIOTT

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WILLIAM HERBERT GATES, founder and treasurer of the Baldwin Chain & Mfg. Co., Worcester, Mass., died Sept. 15 at his summer home near Worcester. He was a prominent member of the National Metal Trades Association.

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CHARLES R. HUNTLEY, president of the Buffalo General Electric Co. and a director of the General Railway Steel Spring Co., Buffalo, died Sept. 17 at his home in Lancaster, N. Y. He began his career as a clerk in a hardware store at West Winfield, N. Y., more than fifty years ago and after a short time in the oil industry became interested in the development of electricity, which has formed his major activity ever since. He was 73 years of age.

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R. D. TATA, who died Aug. 26 at his summer home near Paris, France, was for a number of years chairman of the board of directors of the Tata Iron & Steel Co., Ltd., of India. Associated with his cousin, the late J. N. Tata, in the founding of the company which was the first to manufacture iron and steel in India, he had always taken an active part in its management, although his major interest was the establishment of the cotton spinning industry in the Far East. At the close of the World War, when the survival of the iron and steel industry in India was threatened by the dumping of European pig iron into the country, he was called to the head of the Tata company, and was instrumental in securing the passage of a law by the Indian government which placed a bounty on the domestic manufacture of iron. After seeing the company safely through this crisis, he retired from its active direction and had spent the latter months of his life in comparative retirement in France. At the time of his death he was still a director of the majority of the companies controlled by the Tata interests including the Tata Iron & Steel Co., Ltd.

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HENRY F. BLANCHARD, for some years treasurer Metal Saw Works, Springfield, Mass., and for the past two years assistant to the president American Can Co., New York, died suddenly at his home in Springfield Sept. 20. He was born in Worcester, Mass., March 25, 1885.

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LAWRENCE E. BUZARD, general sales manager of the Fate-Root-Heath Co., Plymouth, Ohio, died Sept. 12 in a Cleveland hospital following an operation for appendicitis. He was born at Adario, Ohio, in 1896, but spent his boyhood in Plymouth, graduating from the high school there. After attending Ohio State University, he enlisted in the field artillery and saw active service in the World War. In 1920 Mr. Buzard entered the employ of the Fate-Root-Heath Co. and was promoted steadily to the position of general sales manager which he held at the time of his death.

L. E. BUZARD

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A. H. MITTENDORF, vice-president and a director of the Marting Iron & Steel Co., Ironton, Ohio, died Sept. 19 in the Marting Hospital at Ironton. He was 72 years of age, and has been identified with iron interests of the Hanging Rock region for the greater part of his business life.

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JOHN M. JANES, president of Lane Brothers Co., Poughkeepsie, N. Y., maker of hoisting blocks, died Sept. 1 at his home in Poughkeepsie.

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DESMOND FITZ GERALD, a former president of the American Society of Civil Engineers, died Sept. 22 at his home in Brookline, Mass., aged 80 years. He had been identified with hydraulic engineering enterprises for the greater part of his life. He was a fellow of the American Academy of Arts and Sciences, a member of the corporation of the Massachusetts Institute of Technology, and a fellow of the Royal Meteorological Society of England. The author of numerous engineering papers, he had twice received the Norman gold medal for the best engineering paper published during the year.

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ANDREW SMITH, for many years active in the development and improvement of electric arc welding of steel, died at his home in Pittsburgh, Sept. 20. He held a number of patents on processes for arc welding air, water and steam-tight tanks, which are used by the Riter-Conley Co., Pittsburgh, and other steel fabricators. He was born in California 50 years ago.

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HOWARD WARD LESTER, treasurer and general manager of the Post & Lester Co., secretary of the Veeder Mfg. Co., maker of castings, and president of the Hall-Thompson Co., manufacturer of cleaning compounds and polishes, all of Hartford, Conn., died at his home in that city Sept. 13. He was 53 years of age.

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JOHN BUTLER, secretary and general manager of Butler Brothers, St. Paul, iron ore shippers, and one of the best known ore men in the Lake Superior district, died at his home in Buhl, Minn., Sept. 22. For years he had charge of the firm's iron mining operations, but retired from active duties about two years ago because of poor health.

Machinery Markets and News of the Works

DEMAND SHOWS GAIN

Bookings at Cincinnati Are Largest Since July

All Selling Centers Report More Active Inquiry —Chicago Exhibition Proves a Stimulating Factor

BOOKINGS of Cincinnati machine tool manufacturers during the past week were the largest since July. Sales made at the National Steel and Machine Tool Exhibition at Chicago, and orders received from automobile manufacturers, contributed to this good showing.

The Delco Light Co., Dayton, Ohio, is the most conspicuous individual buyer, and, in addition to orders previously reported in this column, has placed 37 lathes with an Eastern builder, as well as eight automatic lathes, two planers and a number of shapers, milling machines and screw machines. A manufacturer in the Detroit district has closed for 12 lathes, making its total purchases in the past three weeks 25 lathes. An Eastern automotive company has ordered eight heavy-duty lathes, while another buyer in the same field is about to close for 13 large lathes. It is estimated that from 60 to 75 per cent of recent sales by Cincinnati machine tool builders have been to the motor car industry, and pending inquiries are in about the same proportion.

Chicago and New York report a gain in inquiries, but little actual improvement in buying. Business in New England is described as better, but by no means active. Sales at Cleveland showed some improvement, although not in proportion to the increase in prospective business.

Railroad buying is confined to a number of scattered orders for one or two machines. The Missouri Pacific closed for a sidehead boring mill, a 100-ton bushing press and a 1500-lb. steam hammer, and the New York Central bought a 36-in. planer.

For export to Russia, the Amtorg Trading Corporation, New York, has placed orders for eight engine lathes.

New York

NEW YORK, Sept. 28.

MACHINE tool buying has not shown any appreciable increase in volume the past week, but there has been a gain in the number of inquiries which may be a forerunner of better business next month. The American Brown Boveri Electric Corporation, Camden, N. J., is buying a number of tools. Sales of the week include a 36-in. x 36-in. x 10-ft. planer and 24-in. drill press to the New York Central Railroad, a bolt threader to a Brooklyn manufacturer, jig borer to a can manufacturer, two automatic millers to a magneto company at Sidney, N. Y., bench miller to a Rutherford, N. J., company, bench drill to a Rochester, N. Y., plant, tool makers' lathe and a bench lathe to a company at Saginaw, Mich., two 16-in. geared-head lathes to a tool company at Houston, Tex., and spline milling machine to a Chicago company.

Contract has been let by the Packard Motor Car Co., Broadway and Sixty-first Street, New York, to the C. L. Pierson Co., 46 East Forty-first Street, for a three-story service and repair building, 100 x 300 ft., at Crotona Avenue and Fordham Road, to cost about $350,000. Albert Kahn, Inc., Detroit, is architect.

The Siemund Marine Electric Welding Co., 29 Broadway, New York, will erect a two-story building, 23 x 85 ft., at 426 Washington Street, to cost $30,000. Henry L. Siemund is president.

The Brooklyn Edison Co., Pearl and Willoughby Streets, Brooklyn, is having plans drawn for a six-story service and repair building, 150 x 500 ft., at Fourth Avenue and Third Street; a service, repair and garage building for company motor trucks and cars will be installed. The entire project will cost more than $400,000 with equipment. McKenzie, Voorhees & Gmelin, 342 Madison Avenue, New York, are architects.

The Merchants Refrigerating Co., 17 Varick Street, New York, is reported to be planning the construction of a new multi-story cold storage and refrigerating plant in the vicinity of Pennsylvania and Vanderpool Avenues, Newark, N. J., to cost in excess of $1,000,000 with equipment.

The Universal Gypsum & Lime Co., 103 Park Avenue, New York, formed by a recent merger of the Universal Gypsum Co., Chicago, and the Palmer Lime & Cement Co., 103 Park Avenue, New York, is disposing of a bond issue of $2,000,000, close to one-half the fund to be used for a new mill on Maspeth Creek, Long Island, for the manufacture of building tile, wallboard, plasterboard, etc. W. E. Shearer is president.

The Studebaker Corporation of America, 2040 Broadway, New York, headquarters at South Bend, Ind., has awarded a general contract to the Ralph Sollitt Sons Construction Co., South Bend, for a three-story service and repair building, 100 x 212 ft., at Jamaica, L. I., to cost in excess of $250,000 with equipment.

Officials of the American Brake Shoe & Foundry Co., 30 Church Street, New York, have formed a new subsidiary, the American Brake Material Corporation, to specialize in the production of automobile brake devices. Initial production will be carried out at the plant of the American Malleables Co., Lancaster, N. Y., another subsidiary.

The National Carbon Co., Inc., 30 East Forty-second Street, New York, is planning the early erection of superstructure for its proposed additions at Fostoria, Ohio, comprising furnace, milling, mixing and other departments, to cost close to $1,000,000 with machinery. The Stone & Webster Engineering Co., 147 Milk Street, Boston, is architect and engineer.

The Sinclair Refining Co., 45 Nassau Street, New York, is said to have plans under way for a new storage and distributing plant on the Hackensack River, near Little Ferry, N. J., to cost in excess of $75,000 with equipment.

The Passaic Metal Ware Co., Brook Avenue, Passaic, N. J., has awarded a general contract to the Austin Co. for a two-story addition, 80 x 100 ft., estimated to cost $36,000. I. W. England is president.

Following its recent purchase of the former plant of the Atha Steel Works, foot of Chapel Street, Newark, by the Hanson-Van Winkle Co., Oliver and Chestnut Streets, manufacturer of generators, dynamos, etc., the new owner will concentrate operations at this location and has placed its present plant on the market. Van Winkle Todd is president.

The Jordan Coal Tar Products Co., Lloyd Road, Matawan, N. J., is said to have authorized plans for rebuilding the machine shop and other portions of its plant recently destroyed by fire. The work is estimated to cost $50,000 with equipment.

The Manufacturing Device Corporation, 320 Thomas Street, Newark, has taken out a permit for a one-story machine shop, estimated to cost $55,000.

The F. Storsberg Co., 22 Atlantic Street, Newark, manufacturer of gas and electric lighting fixtures and equipment, has leased the building at 88-90 Washington Street, 60 x 100 ft., and will equip a portion of the structure for a new manufacturing works. It is expected to take possession in December. The present plant will be removed to the new location.

The City Council, Glassboro, N. J., is said to be planning the installation of pumping equipment in connection with proposed extensions and betterments in the municipal waterworks. A bond issue of $225,000, is being sold to carry out the project.

Sears, Roebuck & Co., Arthington and Homan Avenues, Chicago, operating a mail-order business, have plans for a two-story power house at their portable building manufacturing works on Marsh Street, Newark, to cost $47,000 with equipment.

The H. H. Bell Co., steel merchant, has opened an office and warehouse at 426 Greenwich Street, New York, specializing in spring steel, tool steel, and drill rod. Mr. Bell was manager of the A. R. Purdy Co., Inc., for ten years.

The Sun Machinery Co. has moved from 68-70 Clinton Avenue, Newark, to 39 Hamilton Street.

Philadelphia

PHILADELPHIA, Sept. 27.

BIDS are being received by the Philadelphia Gear Works, Richmond and Tioga Streets, Philadelphia, for its two-story addition, to cost close to $150,000 with equipment. Horace W. Castor, Stephen Girard Building, is architect.

The Philadelphia Electric Co., Tenth and Chestnut Streets, Philadelphia, is completing plans for a new steam-operated electric power house, to cost in excess of $750,000 with equipment. John T. Windrim, Commonwealth Building, is architect.

The Department of Supplies, room 312, City Hall, Philadelphia, E. J. Lafferty, director, is asking bids until Oct. 6 for a mechanical draft fan.

Stockholders of the Philadelphia Rapid Transit Co., 810 Dauphin Street, Philadelphia, have approved an increase in preferred stock in amount of $5,000,000, a considerable portion of the proceeds to be used for expansion in the motor bus system. A fund of about $800,000 will be allotted for the construction of new service, repair and garage buildings; about $150,000 will be used for bus service equipment. Approximately $1,700,000 of the appropriation will be used for the regular traction system, including extensions and improvements in electric stations, transmission and distributing lines and car houses.

The Belmont Packing & Rubber Co., Twelfth and Arch Streets, Philadelphia, manufacturer of power plant specialties, has awarded a general contract to the Kessler Construction Co., 1735 North Mervine Street, for a two-story and basement addition, 80 x 132 ft., to cost about $60,000.

The American Brown Boveri Electric Corporation, Camden, N. J., operating at the former yard of the New York Shipbuilding Corporation, has arranged a fund of $1,500,000 for expansion in the present plant. Headquarters are at 165 Broadway, New York.

A. F. Amodie, Commerce Building, Atlantic City, N. J., architect, has plans for a six-story automobile service, repair and garage building, 100 x 100 ft., to cost close to $450,000 with equipment.

The Public Service Electric & Gas Co., Trenton, N. J., has work under way on a 32-mile steel tower transmission line between Philadelphia and a point near the Trenton city limits where an automatic power substation will be located. The project is being carried out jointly with the Philadelphia Electric Co. and will cost more than $3,000,000. The substation will represent an investment of about $750,000 with machinery.

The Yellow Cab Co., 39 North South Carolina Avenue, Atlantic City, N. J., has asked bids on a general contract for a one and two-story service, repair and garage building, 112 x 156 ft., to cost $75,000 with equipment.

The Board of Education, Gloucester City, N. J., plans the installation of manual training equipment in its proposed new senior and junior high school, for which bids have recently been taken on revised plans, to cost in excess of $400,000.

Ovens, about 110 ft. long, gas-fired; power equipment, conveying machinery, blending equipment and other machinery will be required by the Freihofer Baking Co., Nineteenth, Twentieth and Clearfield Streets and Indiana Avenue, Philadelphia, in connection with rebuilding the portion of its plant destroyed by fire Sept. 18, with total loss reported in excess of $250,000.

The F. Wesel Mfg. Co., 70-72 Cranberry Street, Brooklyn, N. Y., manufacturer of printing equipment and supplies, electrotyping equipment, etc., has engaged Lockwood, Greene & Co., 100 East Forty-second Street, New York, architects and engineers, to prepare plans for its new one-story plant at Scranton, Pa., 200 x 500 ft., to cost close to $100,000 with equipment.

Pardee Brothers & Co., 1600 Walnut Street, Philadelphia, operating coal properties in the vicinity of Lattimer and Hazleton, Pa., have work under way on a new coal breaker and expect to carry out the machinery installation at an early date.

The Board of Education, Philadelphia, plans the installation of manual training equipment in its proposed five-story junior high school at Sixteenth and Wharton Streets, to cost in excess of $500,000. Irwin T. Catharine, Franklin Trust Building, is architect.

New England

BOSTON, Sept. 27.

SEPTEMBER is closing a little better than a majority of machine tool dealers in this territory anticipated. Business the past week was by no means active, but sufficient to lend encouragement. Used equipment, at the moment, appears to be in better demand than new. Prices, however, are a bigger factor than heretofore in the used tool market. The recent sale of equipment of the Gray & Davis Co., Cambridge, Mass., was a disappointment and indicated the close margin of profit at which used tools are being sold.

The New York, New Haven & Hartford has bought a new gate shear, and is still negotiating for the rest of its list. Stone & Webster, Inc., Boston, has purchased two power house and one machine shop Niles cranes for a southern power plant. Other local sales reported include a broaching machine, radial drill, upright drill, power saw, three tool room lathes, two small power presses and a hand press, and a two-spindle drill, all to shops within Greater Boston. Bids closed today for an electric cable bench jointer machine wanted by the Boston Navy Yard, Charlestown.

Stone & Webster, Inc., Boston, has been awarded contract for an extension to the Norfolk plant of the Virginia Electric & Power Co., a subsidiary of the Engineers Public Service Co., to cost with equipment $5,000,000. New equipment includes a 30,000-kw. turbo-generator, three 1700-hp. boilers with coal handling apparatus and auxiliary equipment.

The Manchester Traction, Light & Power Co., Manchester, N. H., has awarded a contract to the Morton C. Tuttle Co., Boston, to construct a hydroelectric development at Hooksett, N. H., which includes repairs to a 600-ft. dam, a 40 x 56 ft. power house, and a turbine installation to develop 2200 hp. Work will start immediately.

A permit has been granted the Waltham Grinding Wheel Co., 115 Bacon Street, Waltham, Mass., for a one-story, 50 x 75 ft. addition.

Plans are in progress for a three-story, 42 x 111 ft. manufacturing plant for E. W. Pierce & Chesworth, Inc., Gardner, Mass., machinery. Plans are private. E. W. Pierce is president.

Bigelow, Kent & Willard, 31 St. James Avenue, Boston, engineers, are taking bids for a two-story, 21 x 86 ft. woodworking plant for the Central New England Sanatorium, Rutland, Mass., to cost without equipment $50,000.

J. D. Marr, 384 Dorchester Avenue, South Boston, is about to start the construction of a two-story, 100 x 200 ft. light manufacturing plant at D and Old Colony Streets. E. N. Adams, 68 Old Middlesex Street, Belmont, Mass., is the architect.

About Oct. 1, the office of the Niles-Bement-Pond Co., 125 Purchase Street, Boston, will remove to 75 Batterymarch Street. Marcus Chase is district manager.

The American Steel & Wire Co., Worcester, Mass., is building a two-story, 65 x 208 ft. addition to its shipping department. It has also started the erection of a one-story, 64 x 840 ft. addition to its electric cable plant to cost $150,000. Clinton S. Marshall is district manager.

Work is progressing on a six-story, 200 x 480 ft. plant addition and power house for W. F. Schrafft & Sons Corporation, 160 Washington Street North, in the Charlestown district. Lockwood Greene & Co., 24 Federal Street, Boston, are the engineers. Motors are required.

The Devon Metal Goods Co., Devon, Conn., recently incorporated to manufacture metal trimmings for hose sup-

The Crane Market

BUSINESS has been quiet in the past week with few new inquiries and but little buying. Among outstanding inquiries for overhead equipment are the two 5-ton cranes for West Philadelphia and one 5-ton crane for Pittsfield, Mass., being asked for by the General Electric Co., Schenectady, N. Y. The American Steel & Wire Co., Cleveland, is accepting bids on a large list of overhead equipment for various plants. The inquiry includes a total of 350 electric hoists of ½-ton capacity and 143 stripper cranes of ¼-ton capacity, the cranes distributed as follows: Trenton, N. J., plant, 33; Allentown, Pa., plant, 52; Rankin, Pa., 31; Newburgh, N. Y., 18, and Rockdale, Pa., 9 cranes.

In the Chicago district, the Chicago, Burlington & Quincy is in the market for a 7½-ton, 37-ft. 2-in. span electric crane for its Clyde, Ill., shops. The Sanitary District, Chicago, is inquiring for a 5-ton, 27-ft. 10-in. span, 2-motor overhead crane.

Among recent purchases are:

Stone & Webster, Inc., Boston, one 50-ton and two 15-ton overhead cranes for the Susquehanna Power Co., Conowingo, Pa., from the Niles-Bement-Pond Co.

Stupp Brothers Bridge & Iron Co., St. Louis, a 15-ton overhead traveling crane from the Shaw Electric Crane Co.

American Steel Foundries, Chicago, a 20-ton special electric overhead crane from an unnamed builder.

porters, wire and metal specialties, is headed by A. C. Roffauf as president, instead of Walter D. Grout, as recently stated in THE IRON AGE.

The New Departure Mfg. Co., Bristol, Conn., manufacturer of ball and roller bearings, has taken title to several acres adjoining its plant for future expansion. The company is completing an addition to its electric steel forge shop.

Carlton C. Witham, Amesbury, Mass., has taken over the former plant of the Briggs Carriage Co., Cedar Street, and will remodel for the production of automobile bodies.

The New York, New Haven & Hartford Railroad Co., New Haven, Conn., is reported to be planning the erection of several one-story locomotive and car repair shops on the local waterfront.

Stebbins & Watkins, 164 Federal Street, Boston, architects, have asked bids on a general contract for a two-story automobile service, repair and garage building, 100 x 125 ft., at Somerville, Mass., to cost about $125,000 with equipment.

The City Council, Gloucester, Mass., is completing plans for the construction of a new pumping plant for the municipal waterworks. It is purposed to ask bids early in October. Fay, Spofford & Thorndike, 44 Bromfield Street, Boston, are architects and engineers.

Ovens, power equipment, and conveying apparatus will be installed in the two-story and basement plant to be erected by the New England Baking Co., Main Street, Providence, R. I., to cost in excess of $200,000. McCormick & Co., 41 Park Row, New York, with headquarters at Pittsburgh, are architects and engineers.

Buffalo

BUFFALO, Sept. 27.

THE ELMIRA FOUNDRY CO., Elmira, N. Y., has awarded a general contract to the Lowman Construction Co., 312 Railroad Avenue, for an addition and alterations in present foundry buildings. The entire project will cost in excess of $100,000 with equipment. James D. McCann is president.

Fred B. Davey, 52 West Falls Street, Niagara Falls, N. Y., is said to be at the head of a project to construct and operate a new plant at Buffalo for the manufacture of automobile tires and kindred specialties. The initial works will cost approximately $50,000.

The Pratt & Letchworth Co., 189 Tonawanda Street, Buffalo, manufacturer of malleable iron castings, etc., has plans for a one-story addition to cost about $25,000.

The Parker White Metal & Machine Co., Twenty-Third Street, Erie, Pa., has awarded a general contract to W. S. Wood, 2017 Wayne Street, for the construction of its three-story addition, 60 x 100 ft., to cost close to $35,000 with equipment. W. A. Parker is general manager.

The Binghamton Gas Works, Binghamton, N. Y., has awarded a general contract to Bowie-Clark, Inc., Press Building, for a two-story and basement service and repair building, 62 x 145 ft., to cost $50,000 with equipment. Conrad & Cummings, Phelps Building, are architects. C. E. Bennett is general manager.

The Eberhart Aeroplane & Motor Corporation, 812 East Ferry Street, Buffalo, previously known as the Eberhart Steel Products Co., is arranging for early increase in capacity in commercial airplanes and parts. The company has been working on Government orders for a number of weeks and is now developing its facilities for individual and business use. Cleburne Eberhart, Jr., heads the company.

The White Co., Cleveland, manufacturer of motor trucks, has plans for a branch service and repair building at Syracuse, N. Y., to cost in excess of $50,000.

The Board of Education, Kenmore, N. Y., contemplates the installation of manual training equipment in the proposed three-story addition to the high school, to cost about $300,000. F. J. and W. A. Kidd, 524 Franklin Street, Buffalo, are architects.

The Excel Metal Cabinet Co., Box 742, Jamestown, N. Y., recently incorporated, will manufacture metal medicine cabinets. It has leased a plant with 15,000 sq. ft. of floor space, and has assembled machinery for initial operations which will begin early in October.

The Link-Belt Co., 910 South Michigan Avenue, Chicago, has opened a new branch office in the Foster Building, 131 Genesee Street, Utica, N. Y., which will be given over especially to the sale of Link-Belt silent chain and Link-Belt roller chain. F. P. Hermann, Jr., will be in charge.

Chicago

CHICAGO, Sept. 27.

THE Chicago district machine tool market is quiet when viewed from the standpoint of actual buying. Dealers, however, attribute this to the machine tool exhibition held here last week, which drew prospective purchasers from their desks to view the latest which the trade has to offer. Keen interest was shown in the exhibits, and inquiry has been stimulated as a consequence.

The Illinois Central is asking for a 6-in. and a 2-in. pipe-threading machine and a 2 or 3-in. pipe nipple-making machine. The John Deere Harvester Works, Moline, Ill., has purchased a lathe and is in the market for additional equipment. The International Harvester Co., Chicago, has bought a small lathe.

Deliveries have improved slightly for a few types of machines, and prices are steady. The demand for used tools is fair.

The O. D. Jennings Co., 4239 West Lake Street, Chicago, manufacturer of coin machines will build a two-story factory, 31 x 56 ft. to cost $15,000. I. C. Saxe, 351 Beldon Avenue, is the architect.

John India, 1439 Ogden Avenue, Chicago, will build a two-story automobile repair shop. E. A. Nitsche, 28 East Huron Street, is the architect.

The Pyle National Co., 1334 North Kostner Avenue, Chicago, will build a foundry, 73 x 161 ft. to cost $50,000. The architect is F. E. Davidson, 53 West Jackson Boulevard.

The American Can Co., is reported to have purchased a large tract of land on Sheridan Road, opposite the works of the American Steel & Wire Co., at Waukegan, Ill., for the erection of a new plant.

The Wagner Malleable Iron Co., 751 North Lowber Street, Decatur, Ill., is considering the construction of a one-story annealing building, 75 x 126 ft., to cost close to $85,000 with equipment. A. W. Wagner is president.

The International Motor Co., 25 Broad Street, New York, and 2231 University Avenue, St. Paul, Minn., will begin superstructure for its one-story and basement factory branch and service building for the Mack Motor Truck Division, St. Paul. It will approximate 60,000 sq. ft. of floor space, a portion of which will be equipped for assembling. It will cost in excess of $200,000 with equipment.

The Butler Street Foundry & Iron Co., 3424 Normal Avenue, Chicago, has awarded a general contract to Carl Bushnell, 133 West Washington Street, for rebuilding the portion of its plant recently destroyed by fire. It will be one story, 60 x 267 ft., and cost $50,000. A. Epstein, 2001 Pershing Road, is architect and engineer.

The Goss Printing Press Co., 1536 South Paulina Avenue, Chicago, has awarded a general contract to the George

Thompson Co., 30 North La Salle Street, for a three-story and basement addition, 95 x 155 ft., to cost $150,000 with equipment. G. C. Abbott is secretary.

The Western Screw Mfg. Co., 4413 West Kinzie Street, Chicago, has awarded a contract to A. B. Larson, 195 La Salle Street, for a one-story addition, 50 x 100 ft. R. H. L. Oliver, 115 South Dearborn Street, is architect.

The Diamond Motor Car Co., 28 South Sangamon Street, has awarded a general contract to A. Irving Jordan, 111 West Washington Street, for a one and two-story and basement service and repair works, 196 x 250 ft., to cost in excess of $135,000 with equipment. Clayton Smith is manager.

The Electric Machinery Mfg. Co., 1331 Taylor Street, N. E., Minneapolis, Minn., will soon proceed with superstructure for a two-story and basement addition, 40 x 110 ft., and 26 x 52 ft., to cost about $35,000. Downs & Eads, Phoenix Building, are architects.

The National Plate Glass Co., Ottawa, Ill., will soon begin the construction of a one-story furnace building, 75 x 100 ft., to cost $200,000 with machinery. J. M. Berg is president.

The Nye Tool & Machine Co., 4120 Fullerton Avenue, Chicago, has work under way on a one-story addition, 100 x 100 ft., to cost close to $45,000 with equipment. Mundie & Jensen, Chicago, are architects.

The City Council, Eldora, Iowa, plans the installation of pumping machinery and auxiliary equipment in connection with proposed extensions in the municipal waterworks. The Higgins Co., 420 Securities Building, Des Moines, Iowa, is engineer.

Cincinnati

CINCINNATI, Sept. 27.

SALES made at the Chicago exposition and orders placed by automobile manufacturers have given a further impetus to the machine tool market. Bookings the past week were the largest since July, and prospective business is of extensive proportions. The outstanding transaction has been the purchase of additional equipment by the Delco Light Co., Dayton. Tools bought by that company in the last seven days include 37 lathes from an Eastern builder, eight automatic lathes, two planers and a number of shapers, milling machines and screw machines. A manufacturer in the Detroit district closed for 12 lathes, this buyer having purchased a total of 25 lathes in the past three weeks. An Eastern automotive company took eight heavy-duty lathes, while another company in the same field is expected to contract for approximately 13 large lathes. A company in the Cleveland territory is negotiating for nine lathes. It is estimated that from 60 to 75 per cent of the recent sales in this market have been to automobile makers, and present inquiries indicate little departure from this figure in the immediate future.

The Amtorg Trading Corporation bought eight lathes for export to Russia. The Missouri Pacific purchased a sidehead boring mill, a 100-ton bushing press and a 1500-lb. steam hammer, and the New York Central took a 36-in. planer. The Boston & Maine closed for a No. 5 grinder. A Dayton company bought four No. 12 Pratt & Whitney profiling machines, while a local manufacturing concern took a thread miller. The Westinghouse Electric & Mfg. Co. purchased a sidehead boring mill, and the Detroit Street Railway Co. contracted for a 48-in. carwheel lathe.

The King Machine Tool Co., Clifton Avenue, Cincinnati, manufacturer of boring mills, recently has installed new heat treating equipment, new boilers and a number of machine tools. Edward Muller is vice-president and general manager.

The plant of the Moeschl-Edwards Corrugating Co., Inc., 120 West Ninth Street, Covington, Ky., manufacturer of sheet metal products, was destroyed by fire Sept. 18. Plans for rebuilding are under way.

The Allison Pattern Works, formerly at Swanee and Wyandot Streets, Dayton, Ohio, has moved to 460 Bacon Street.

The Tool Steel Gear & Pinion Co., Elmwood Place, Cincinnati, has awarded a general contract to William Miller & Son, 2017 Elm Street, for a two-story addition, 25 x 80 ft., to cost $30,000. Improvements will also be made in the present plant. Tietig & Lee, Mercantile Building, are architects. L. N. Gatch is president.

The Board of Water Commissioners, Memphis, Tenn., James Sheahan, general superintendent, is asking bids until Oct. 20 for one cross-compound, two-stage air compressor, one 350-hp. watertube boiler, one stoker unit, and auxiliary equipment. Specifications at office of general superintendent, North Second Street and Adams Avenue.

George F. Schlesinger, director of State highways, Columbus, Ohio, will soon ask bids for a one-story service, repair and garage building, 80 x 200 ft., for State-owned motor trucks and highway equipment at New Philadelphia, Ohio, to cost $115,000 with tools and machinery.

The Board of Education, Dayton, Ohio, C. J. Schmidt, clerk, is asking bids until Oct. 8 for three mechanical stokers for the Roosevelt high school, to replace existing units.

The Tennessee Slate Products Co., Maryville, Tenn., is considering plans for a new works, including complete slate quarry and branch department for the production of cement bricks, blocks, etc. It will install quarrying equipment, mechanical fans, air compressors, tram cars, etc. The initial plant will cost close to $100,000 with machinery. James L. Cawthon is secretary.

Indiana

INDIANAPOLIS, Sept. 27.

THE Thomas & Skinner Steel Products Co., Empire and Harmon Streets, Indianapolis, manufacturer of permanent magnets, precision equipment, etc., has acquired the former plant of the Pioneer Brass Works, 150 x 185 ft., at Twenty-third Street and the Monon Railroad, for $58,000. The present works will be removed to the new location and additional equipment provided for increase in output. J. R. Thomas is president, and O. H. Skinner, secretary and treasurer.

The Superior Body Works, 1919 South Branson Street, Marion, Ind., expects to ask bids late in October for a one-story addition to cost about $30,000 with equipment. J. B. Sisson is general manager.

The Liquid Carbonic Co., 3100 South Kedzie Avenue, Chicago, has completed negotiations for the purchase of the Baur Carbonic Co., Indianapolis, with branch plant at Louisville, and will consolidate with its organization. Plans are under advisement for expansion in the Indianapolis works of the Baur company, including a new building. The Louisville branch, it is said, will be extended later.

The Schacht Rubber Co., Huntington, Ind., is planning a two-story addition, 42 x 80 ft., for which it is expected to ask bids in October.

Stout-Smith (Trust), Salem, Ind., manufacturer of radio and talking machine cabinets, etc., has leased adjoining property for expansion and will add about 100 to the working force.

The Kolograph Co., 216 East Maryland Street, Indianapolis, manufacturer of motion picture machines, has leased space in the Sanborn Building, North Illinois Street, providing about 5000 sq. ft. additional floor area, and will remove its plant to this location. New equipment will be provided for increased capacity, including parts manufacture. L. D. Kohlmeyer is head.

Detroit

DETROIT, Sept. 27.

CONTRACT has been let by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., to the Everett Winters Co., 1651 East Grand Boulevard, Detroit, for its four-story factory branch and distributing plant at Detroit, to cost about $175,000 with equipment. Albert Kahn, Inc., Marquette Building, is architect.

Plans have been completed for a reorganization of the Central Wheel Co., Muskegon, Mich., manufacturer of automobile wheels. The capital has been increased from $60,000 to $100,000 and additional facilities will be provided for larger output. Frank E. McKee, formerly general manager of the Campbell, Wyant & Cannon Foundry Co., is president under the new organization.

The Metropolitan Engineering & Construction Co., Charlevoix Building, Detroit, has plans for a two-story plant, 60 x 120 ft., at Muskegon, Mich., for a company whose name is temporarily withheld. It will cost close to $150,000 with equipment.

The American Standard Tool Works, Chicago, has acquired a factory at Pontiac, Mich., heretofore held by A. E. McLintock, and plan the early establishment of a branch foundry for the production of brass, bronze and aluminum castings.

The Detroit City Gas Co., Clifford and Bagley Avenues, Detroit, will soon take bids for a one-story service and repair building, 50 x 160 ft., at River Rouge, Mich., to cost about $75,000 with equipment. Weston & Ellington, Stroh Building, Detroit, are architects. C. W. Bennett is vice-president and general manager.

The Sauzedde Wheel & Tool Co., Mount Clemens, Mich., has removed its plant to 209 East Baltimore Avenue, Detroit, where operations will be increased.

The New Egyptian Portland Cement Co., State Street, Port Huron, Mich., is reported to have plans under consideration for the construction of an addition to its mill at Fenton, Mich., and the establishment of a new plant at Holly, Mich. The work will be carried out in connection with a general expansion program and is expected to cost more than $400,000. Charles A. Bray is secretary and treasurer.

The Hinkley Motors & Parts Corporation, Detroit, recently organized, will succeed to the plant and business of Hinkley Motors, Inc., Detroit and Ecorse, Mich. The new company plans increase in production and will specialize in heavy duty equipment, including four-cylinder motors for commercial vehicles, four-speed sliding gear transmissions, etc. The plant of the Mott Wheel Co., Jackson, Mich., has been acquired and will be used to concentrate manufacture. The Detroit works will be removed immediately to this location and additional equipment will be installed. C. C. Hinkley is president and general manager and H. B. Small, vice-president and treasurer.

The V-R Fuel Pump Corporation, 40 West Milwaukee Avenue, Detroit, has been incorporated with $50,000 preferred stock and 2500 shares of no par common stock, and will manufacture the V-R electric fuel pump. The plant is in operation at the above address. G. A. Maher is president and general manager.

The Hill Bolt Co., 1155 Bellevue Avenue, Detroit, has been incorporated with capital stock of $50,000 and has equipped a new factory at the above address for the manufacture of machine and carriage bolts in sizes of ⅝ in. x 6 in. and smaller and shorter. R. H. Hill is president of the company; C. M. Hill, vice-president and treasurer, and W. H. Urquhart, secretary and superintendent.

Gulf States

BIRMINGHAM, Sept. 27.

EXPANSION plans have been arranged by the Joubert & Goslin Machine & Foundry Co., Birmingham, manufacturer of sugar refining equipment, to include a department for the manufacture of evaporating and drying machinery and other heavy equipment for chemical plants. The company is disposing of a bond issue of $250,000, the proceeds to be used in part for the extension.

The Transcontinental Oil Co., Tulsa, Okla., with headquarters in the Benedum Trees Building, Pittsburgh, is said to have plans for a new gasoline refinery on the Nigger Creek oilfield, near Mexia, Tex., to cost $200,000 with equipment.

The State Board of Control, Austin, Tex., H. H. Harrington, chairman, has plans for a one-story industrial and shop building for the juvenile training school at Gatesville, Tex., estimated to cost $80,000. Milton W. Scott & Co., 412 Franklin Avenue, Waco, Tex., are architects.

Fire, Sept. 16, destroyed a portion of the plant of the Mack Auto & Carriage Works, Mobile, Ala., with loss reported in excess of $40,000 including equipment. It is planned to rebuild.

The Central Power & Light Co., Frost Building, San Antonio, Tex., is considering extensions in its steam-operated electric power plant at Del Rio, Tex., including the installation of Diesel engine and accessory equipment. The company has also authorized additions in its transmission system, totaling about 100 miles in all, for service at Eagle Lake, Columbus, Tex., and vicinity.

The Southern Pacific Railroad Co., Texas Lines, Houston, Tex., has begun the construction of a new locomotive terminal and repair shops at Dallas, Tex., including 6-stall engine house and shop, oil house, sand house and other buildings, with power plant, 40 x 50 ft. A transfer crane and 15-ton stiff-leg derrick will be installed. An automatic electric-operated water supply plant will be provided. The entire project, including freight stations on adjoining site will cost about $550,000. H. M. Lull, Houston, is chief engineer.

W. M. Smith & Co., First Avenue, Birmingham, machinery dealers, have inquiries out for an engine-generator set, direct-connected, with generator from 400 to 500 kw. rating, a.c., 550 to 600 volts.

Fire, Sept. 16, destroyed a portion of the plant of the Claiborne Motor Co., Homer, La., and the wood-working division at the repair shops of the Louisiana & Northwestern Railway Co., on adjoining site, as well as a considerable section of the plant of the Planters' Compress Co. The complete loss is reported upward of $250,000 with equipment. All of the companies plan early rebuilding.

The Alabama Foundry Co., North Birmingham, has broken ground for a new one-story foundry for the production of iron and steel castings. The structure will be used in conjunction with the plant of the Davis Pipe & Fittings Co., recently acquired, and to be remodeled. The entire project is reported to cost more than $600,000.

The West Point Casket Factory, West Point, Miss., recently organized by E. E. Gay, Goodwater, Ala., and J. L. Ingram, Sylacauga, Ala., has plans for the early establishment of a factory at West Point, to cost more than $40,000 with equipment.

The Manchester Terminal Corporation, Houston, Tex., recently organized, has begun the construction of a new cotton compress plant on the south bank of the Houston ship channel, aggregating 630,000 sq. ft. of space. The company has disposed of a bond issue of $2,700,000, a large portion of the fund to be used for construction. Joseph W. Evans is president.

The W. B. Paterson Clay Co., First National Bank Building, Mobile, Ala., has plans for rebuilding its plant at Rendell, near Mobile, recently destroyed by fire. The entire works will cost about $80,000 with equipment. Frank L. Sayner is general manager.

The Board of Education, San Angelo, Tex., plans the installation of vocational training equipment in its proposed two-story junior college estimated to cost $250,000, for which bids will soon be asked on a general contract. Phelps & Dewees, Gunter Building, San Antonio, Tex., are architects.

The Panhandle Light & Power Co., Panhandle, Tex., operated by the Kansas City Light & Power Co., Kansas City, Mo., has work in progress on the first unit of a steam-operated electric generating plant at Plemons, Tex., with capacity of 10,000 kw. A second unit of like size will be installed in the near future. The entire project, with transmission lines, will cost close to $1,000,000.

The Chicago Pneumatic Tool Co. has established a sales and service branch in the Mills Building, El Paso, Tex., to better serve its customers in southwestern Texas, New Mexico, eastern Arizona and northern Mexico. E. J. Coughlin is in charge.

South Atlantic States

BALTIMORE, Sept. 27.

PLANS are being considered by the Eastern Shore Gas & Electric Co., Salisbury, Md., for a new steam-operated electric power house, to cost in excess of $100,000. F. N. Lawton is general manager.

The American Ice Co., Calvert Building, Baltimore, has purchased local property and contemplates the erection of a one-story ice-manufacturing plant, to cost close to $70,000 with equipment. C. Leslie Weir, 41 East Forty-second Street, New York, is company architect.

A. K. Robins & Co., Inc., Lombard Street and West Falls Avenue, Baltimore, manufacturer of canning machinery, R. A. Sindall, president, is desirous of securing information on electric hoists and wants to get in touch with manufacturers.

The Motor Ramp Garage Co., Baltimore, has taken out a permit for the construction of its proposed six-story service, repair and garage building, 80 x 120 ft., to cost in excess of $400,000 with equipment.

The Broad River Power Co., Columbia, S. C., has arranged for a bond issue of $1,000,000, a portion of the proceeds to be used for extensions and improvements. It recently completed the installation of a steam-operated electric power plant at Parr Shoals on the Broad River, and plans further development in this district. The company is operated by the General Gas & Electric Corporation, 50 Pine Street, New York. W. S. Barstow is president.

The City Commission, Fredericksburg, Va., has arranged a fund of $100,000 for extensions in the municipal water system, to include the installation of new pumping units and other power equipment. George W. Fuller, 170 Broadway, New York, is engineer. L. J. Houston, Jr., is city manager.

The Weston & Brooker Co., Columbia, S. C., operating granite properties, is considering the establishment of a new plant for the production of crushed granite and rip-rap, to cost in excess of $85,000 with machinery.

The Glennville Mfg. Co., Glennville, Ga., is contemplating the erection of a new refrigerating and cold storage plant and the installation of a 20-ton capacity ice unit, oil engine and auxiliary equipment. J. C. Beasley is general manager.

The Auto Glass & Radiator Shop, 128 Center Street, Augusta, Ga., is planning the installation of additional equipment, including glass-grinding, cutting and polishing machines.

The City Council, Macon, Ga., is considering the installation of a new centrifugal pumping unit with daily capacity of about 10,000,000 gal. and auxiliary equipment at the municipal waterworks. An appropriation of $60,000 is being arranged.

The Hackley-Morrison Co., 1708 Lewis Street, Richmond, Va., machinery dealer, has inquiries for a belt conveyor, 20 to 24-in. belt, about 50-ft. centers between rollers, with troughing rollers, return rollers, etc., complete, suitable for handling loose dirt; also for an electric alternator, 35 kva., low voltage type, steam-operated, complete with exciter.

The Hunt-Gwyn Motor Co., Lenoir, N. C., has plans for a three-story automobile service, repair and garage building, 50 x 90 ft., to cost $70,000 with equipment.

The Tide Water Power Co., Wilmington, N. C., has arranged for a new bond issue of $3,750,000, a portion of the fund to be used for extensions. Through a subsidiary organization the company is expanding operations to cover Florida territory from St. Petersburg north to the Georgia State line. The complete project will cost close to $6,000,000.

The Board of Education, Baltimore, will install manual training equipment in the four-story high school to be erected on the Gwynns Falls Parkway, estimated to cost $1,200,000, for which general contract has just been let to the P. C. Street Engineering Co., 404 St. Paul Street. J. E. Sperry, Calvert Building, is architect.

Spoon, Lewis & Camp, American Bank Building, Greensboro, N. C., engineers, have inquiries out for a deep-well pumping unit for waterworks service at Liberty, N. C.

Cleveland

CLEVELAND, Sept. 27.

WHILE business in machine tools is still rather slow, sales by local dealers improved slightly the past week. Cleveland manufacturers who had displays at the exposition in Chicago last week report a very satisfactory amount of interest shown in the machine tool exhibits and as a result many good prospects have developed. The Delco Light Co., Dayton, Ohio, continues to place orders. The demand for turret lathes in single machines continues fairly active.

The H. K. Ferguson Co., Cleveland, has taken a contract for two buildings for the Chrysler Corporation, Detroit, consisting of a one-story, 220 x 286-ft. extension to the motor plant and the construction of a boiler house, 63 x 120 ft. The estimated cost is $250,000.

The Art & Bronze Co., 1782 East Thirty-seventh Street, Cleveland, is having plans prepared for a two-story foundry, 70 x 125 ft.

The McCurdy Mfg. Co., Ada, Ohio, is contemplating the erection of a one-story plant, 40 x 150 ft.

The Chain Products Co., Cooper Avenue and Pennsylvania Railroad, Cleveland, has taken bids for a two-story and basement factory and garage, 55 x 145 ft.; Carter & Richards, 622 Engineers Building, are the architects.

The Fisher Body Ohio Corporation, Cleveland, has taken bids for a $500,000 office and factory building at East 140th Street and Coit Road. E. F. Fisher is president.

J. D. Marks has purchased the warehouse of the Fishel & Marks Co., Krakow Avenue and East Seventy-first Street, Cleveland, and will operate hereafter under his own name in the handling of steel mill products and scrap. Mr. Marks was one of the founders and controlling partners of the Fishel & Marks Co., which has been practically liquidated.

The Akron Pump & Supply Co., 39 West Market Street, Akron, Ohio, recently incorporated to engage in jobbing of pumps, pipe, valves and fittings, is headed by T. J. Siebert, president, and Robert E. Lee, general manager. Mr. Lee was formerly with the Deming Co., pump manufacturer, Salem, Ohio.

The firm of Wardle & Kellogg, Fort Madison, Iowa, was dissolved Sept. 15, and R. H. Wardle will continue in the business which will hereafter be known as R. H. Wardle & Co.

Milwaukee

MILWAUKEE, Sept. 27.

LOCAL machine tool manufacturers appear well satisfied with the result in orders from the exhibition at Chicago last week. While sales attributable to the exposition were not of great volume, nevertheless business has been freshened perceptibly and is expected to be sustained and reflected in October and November sales. In the regular run of business, orders are largely for single items and come from a wide range of sources. Automotive buying is not general, but bulk is provided by the needs of a number of the principal producers, notably units of the General Motors group.

The Chicago & North Western Railroad Co. has let the general contract to Joseph E. Nelson & Sons, 3240 South Michigan Avenue, Chicago, for the erection of a steam generating plant, 48 x 107 ft., estimated to cost $65,000, at its shops at Antigo, Wis. Later the shops will be remodeled and some retooling is in prospect. W. J. Towne, 226 West Jackson Boulevard, Chicago, is chief engineer.

The Jambor Tool & Stamping Co., 1261 Thirtieth Street, Milwaukee, has awarded contracts for the erection of a one-story addition, 60 x 71 ft., to cost $25,000 with equipment, most of which has been ordered.

The Harvey Spring & Forging Co., Racine, Wis., is contemplating the erection of an addition to its shops to accommodate the growth of a new department for the manufacture of automobile steel bumpers. Details have not been announced as yet. E. J. Harvey is president and general manager.

The Waukesha Motor Co., Waukesha, Wis., manufacturer of heavy duty engines, has changed its capitalization so that the authorized issue will be all common stock in the number of 20,000, with a par value of $100 a share. It has been doing considerable rebuilding and retooling, and further activity is in prospect during the winter. Harry L. Horning is president and general manager.

The Wisconsin Hydro-Electric Co., Amery, Wis., has accepted the bid of Siems, Helmers & Schaffner, 514 Guardian Life Building, St. Paul, Minn., for the construction of a new hydroelectric generating plant costing about $250,000 on the Namakagon River at Trego, Washburn County, Wis. Ralph D. Thomas, 1200 Second Avenue, Minneapolis, is consulting engineer. E. J. Schreider, Amery, is president.

R. H. Davis & Son, Mauston, Wis., who are building a new hydroelectric generating plant, are in the market for a miscellaneous list of equipment, including an 8-ton chain block with trolley. L. A. DeGuere, Wisconsin Rapids, Wis., is consulting engineer.

The Parker Truck Service Co., 606 Linus Street, Milwaukee, which is resuming the manufacture of Parker trucks, has changed its name to the Parker Truck Co., Inc. Production was suspended following the death of W. H. Parker some time ago, and the business operated as a service to Parker truck owners. Considerable retooling is being done. J. Grossmann is president and general manager.

The Central Wisconsin Power Co., Oshkosh, Wis., is planning extensions and improvements to cost $45,000 in its plant at Withenburg, Wis.

The Appleton Ornamental Iron & Brass Works, Appleton, Wis., a newly incorporated company with capital stock of $10,000, will manufacture all kinds of ornamental iron and bronze work. Adolph Weise is president; E. A. Kottke, secretary and treasurer, and Carl Korth, vice-president.

Pittsburgh

PITTSBURGH, Sept. 27.

WORK is in progress on razing the last of the three former rolling mills of the Carnegie Steel Co. at the foot of Thirty-third Street, Pittsburgh. The site has been leased by the Pennsylvania Lubricating Co., Thirty-fourth Street and the Allegheny Valley Railroad, for the construction of an oil storage and distributing plant to cost in excess of $80,000 with equipment. It is expected to begin erection in about 60 days.

The National Casket Co., Oliver Building, Pittsburgh, has plans for a two-story and basement factory, 50 x 60 ft., to cost more than $50,000 with equipment. The Bruner Co., Columbia Building, is architect and will likely receive the general contract. F. B. Heintz is president.

The North Pole Cold Storage Co., 1218 West Carson Street, Pittsburgh, will make extensions and improvements in its cold storage and refrigerating plant, to cost about $50,000 including equipment.

The South Penn Oil Co., Wolf Summit, near Clarksburg, W. Va., H. L. Bliss, head, is said to have tentative plans for a new gasoline refinery in the vicinity of Coplay, W. Va., to cost more than $90,000 with equipment.

The Warren Refining Co., Warren, Pa., is reported to be contemplating rebuilding the portion of its oil refinery recently destroyed by fire, with loss in excess of $75,000 including equipment. M. W. Jamieson, Jamieson Hardware Co., Warren, heads the company.

The City Council, City Hall, Pittsburgh, is considering the electrification of the water pumping station on Howard Street. Plans are also under advisement for the electrification of other pumping plants used for the municipal waterworks.

The Borough Council, Brackenridge, Pa., G. H. Dickey, secretary, is asking bids until Oct. 5 for one centrifugal pumping unit, comprising a two-stage pump with bronze impellers, bronze covered steel sash, etc., with rated capacity of 1400 gal. per min.

A. & W. Schmidt, Penn and Fancourt Streets, Pittsburgh, have awarded a general contract to the Building & Indus-

trial Construction Co., 403 Penn Avenue, for a six-story addition to their automobile service, repair and garage building, 60 x 100 ft., to cost in excess of $100,000 with equipment. A. M. Bowman, Bessemer Building, is engineer.

St. Louis

ST. LOUIS, Sept. 27.

CONTRACT has been let by the Missouri Casket Co., 2106 East Ninth Street, Kansas City, Mo., to Collins Brothers, Davidson Building, for a new three-story plant, 45 x 120 ft., to cost about $70,000 with equipment.

The A. P. Green Fire Brick Co., Mexico, Mo., will soon take bids for a one-story addition to its refractory plant, 60 x 500 ft., to cost $200,000 with equipment. J. H. Brown is secretary.

The Vesper Buick Automobile Co., Vandeventer and Laclede Streets, St. Louis, has filed plans for a two-story repair shop and general service building, 120 x 150 ft., to cost $145,000 with equipment.

The Dewey Portland Cement Co., Mutual Building, Kansas City, Mo., is disposing of a bond issue of $2,000,000, a considerable portion of the proceeds to be used for the construction of a new mill at Davenport, Iowa. The company is now operating a mill at Dewey, Okla.

The Arthur Delatierre Handle Co., Camden, Ark., plans the early rebuilding of the portion of its plant destroyed by fire Sept. 14, with loss estimated at $50,000 including equipment.

Fire, Sept. 13, destroyed the mill of the Excelsior Powder Mfg. Co., Gumbel Building, Kansas City, Mo., at Holmes Park, with loss estimated at $100,000 including equipment. Plans are under consideration for early rebuilding.

The Hastings Mills Co., Hastings, Neb., is considering the construction of a new grain elevator with loading, hoisting, screening and other equipment.

G. M. Einhart, Roswell, N. Mex., and associates, who recently purchased the municipal electric light and power plant at Alamogordo, N. Mex., are contemplating the erection of a steam-operated electric generating plant to cost $175,000.

The Standard Oil Co., Jefferson and Locust Streets, St. Louis, will proceed with the erection of a new one and one-half story oil storage and distributing plant, 100 x 100 ft., and 78 x 96 ft., to cost $50,000. An automobile service and repair department will be provided for company motor trucks. Schlinz & Bailey, 53 West Jackson Boulevard, Chicago, are architects.

Pacific Coast

SAN FRANCISCO, Sept. 22.

THE Pacific Fruit Express Co., 65 Market Street, San Francisco, will award all contracts within the next 30 days for the completion of its new car shops and precooling plant at Roseville, Cal., work on which has started. The project consists of 36 shop and operating buildings estimated to cost $1,500,000 with equipment.

The Illinois-Pacific Glass Co., Fifteenth and Folsom Streets, San Francisco, is considering plans for a new branch plant at Vernon, Los Angeles, to cost in excess of $500,000 with machinery.

The United States Metal Products Co., 330 Tenth Street, San Francisco, will erect a one-story plant to cost close to $21,000 with equipment. Theodore W. Lenzen, 785 Market Street, is architect.

The West Coast Pulp & Paper Co., Olympia, Wash., has completed plans for a one-story addition to cost about $65,000 on which work will begin at once. H. S. Gile is secretary.

C. F. Braun & Co., 1200 Fremont Avenue, Alhambra, Cal., manufacturers of equipment for gasoline and absorption plants, power plant apparatus, etc., are said to have plans under advisement for one or more one-story additions.

The Union Ice Co., Ventura, Cal., has acquired property on Main Street as a site for a proposed new refrigerating and cold storage plant.

The Seattle Chain & Mfg. Co., 6921 East Marginal Way, Seattle, has awarded a contract to the G. Kilgren Co., Mutual Life Building, for a one-story addition, 50 x 56 ft.

The Rheem Mfg. Co., Forty-fifth and Horton Streets, Oakland, Cal., has recently been organized by R. S. and D. L. Rheem for the manufacture of sheet steel products. The new plant, including the site of about four acres, represents an investment of about $180,000. The building, which is of frame with galvanized iron walls and roof, has a floor space of about 22,000 sq. ft. Associated with Messrs. Rheem will be David C. Curtis, formerly connected with a manufacturer of sheet steel products in the East. It is planned to operate a hot-dip galvanizing plant. Barrel-making machinery will be installed and will be ready about Oct. 15. It will include power presses for operations requiring various pressures up to as high as 250 tons. The company will specialize in making barrels, drums and other metal containers.

The Boyle Mfg. Co., Los Angeles, is establishing a $250,000 branch plant at Alameda, Cal., to take care of its business in the northern part of the State. Production will include the manufacture of steel oil drums, paint pails, galvanized ware and steel household appliances. Machinery is now being installed. The Union Iron Works has furnished a 7½-ton crane. W. J. Boyle, Sr., is president; I. M. Boyle, vice-president, and W. J. Boyle, Jr., secretary-treasurer.

The American Steel Tank & Pipe Co., with general offices in the Garland Building, Los Angeles, has recently remodeled its plant at Alhambra. A Shepard overhead crane has been installed in the new buildings.

The Link-Belt, Meesen-Gottfried Co., San Francisco, has purchased property in South San Francisco, adjacent to San Bruno Avenue, where preliminary work has been started on a plant which will cost about $1,000,000.

De Lon-Almquist Co., 414 East Third Street, Los Angeles, has changed its firm name to Machinists' Tool & Supply Co.

Canada

TORONTO, Sept. 27.

MACHINE tool sales the past week were chiefly confined to units of one or two for replacement purposes. The automotive industry is doing little buying at present, although extensions under way at the Oshawa works have resulted in some good sales, and additional buying on this account is expected. Second-hand machines are in fairly good demand from small plants. Considerable buying is being done by pulp and paper mills and mining interests in northern Ontario. Inquiries on export account are increasing, especially from New Zealand and Australia.

N. M. Paterson & Co., Fort William, Ont., will let subcontracts in connection with a warehouse and machine shop to be erected there at a cost of $10,000. Equipment will be required.

The Disher Steel Construction Co., 30 Commissioner Street, Toronto, has been awarded the steel contract in connection with a $50,000 addition to the plant of the Skinner Co., Ltd., Gananoque, Ont.

Several contracts have been awarded in connection with a $30,000 factory to be erected for the Johnson Wire Works, 50 Dagenais Street, Montreal.

The Davie Shipbuilding & Repairing Co., Lauzon, Que., has been awarded contract for the construction of a ship to cost $1,000,000 for the Canadian Steamship Lines, Ltd., 9 Victoria Square, Montreal.

The Canadian Bridge Co., New Birks Building, Montreal, has been awarded contract for the structural steel in connection with smelter being erected at Rouyn, Que., to cost $1,000,000 for the Noranda Mines & Copper Corporation, Ltd., Keefer Building, Montreal.

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The Rutherford Milling Co., Blenheim, Ont., is having plans prepared for the erection of a flour mill and elevator to cost approximately $100,000. Complete equipment is required.

The Spanish River Pulp & Paper Mills, Ltd., Sault Ste. Marie, Ont., has started work on an addition to its mills to cost $700,000. The extensions include rebuilding of the boiler house and the installation of two steam turbine generators, two electric grinders and other equipment.

The Rawdon, Que., plant of the Quebec Southern Power Corporation, will be replaced with a new structure of concrete and steel designed to produce 8000 hp. The first unit of 2800 hp. will be installed immediately. The cost of the proposed plant is estimated at $600,000.

The City Council, Montreal, voted $19,750 for the purchase of a steam crane. H. A. Terreault is director of public works.

Western Canada

The plant of the Western Steel Co., Medicine Hat, Alta., will be re-opened within two months, after a shutdown of two or three years. This step is to be taken following an agreement ratified by the City Council. The company sought and obtained from the city special rates and concessions for the supply of gas.

Foreign

THE Corporation for the Technical and Economic Development of the Sulphur Industry, Sicily, Italy, is arranging for the complete electrification of its plant and proposes to finish the project within 36 months. The enterprise will be carried out in cooperation with the General Electric Co. of Sicily, which will construct a new steam-operated electric generating plant at Catania, with the building of transmission lines to Caltanissetta, Campo-Franco and vicinity. The entire project is estimated to cost $1,280,000 of which the corporation will defray close to $300,000. The American Consulate, Catania, Sicily, Ilo C. Funk, consul, has information regarding the work.

Siemens & Halske A. G. and Siemens-Schuckertwerke G. m. b. H., Berlin, Germany, affiliated, manufacturers of electrical machinery, have arranged through Dillon, Read & Co., Nassau and Cedar Streets, New York, for the sale of a bond issue of $24,000,000 in the United States, a portion of the proceeds to be used for expansion and improvements. Dr. Carl von Siemens is chairman of the board of each company; the Central Union Trust Co., 80 Broadway, New York, is American trustee for the companies.

Senor Lizandro A. Proano, Lima, Peru, and associates are planning the construction of a hydroelectric generating plant at Tamboraque, with ultimate capacity of 12,000 hp. A transmission line will be constructed to furnish power to mining interests at Germania, Morococha, Puna Grande and vicinity. The entire project is expected to cost in excess of $1,000,000. The American Consulate, L. W. James, commercial attaché, Lima, has information regarding the enterprise.

Trinidad Oil Fields, Inc., New York, William Warfield, president, care of Huntington, Jackson & Co., 43 Exchange Place, bankers, recently organized, has acquired approximately 27,000 acres of oil lands on the Island of Trinidad, British West Indies, and plans extensive developments and operations, including drilling equipment, storage and distributing facilities, pumping apparatus, etc. Mr. Warfield was formerly manager of the foreign production department of the Standard Oil Co. of New Jersey. Frank Seamans, vice-president General Asphalt Co., Philadelphia, is interested in the new organization and will be a director.

The Government of Iceland has granted a concession for the construction of a refrigerating and cold storage plant at Reykjavik and it is purposed to begin work soon. Information at the office of the Bureau of Foreign and Domestic Commerce, Washington, reference Norway No. 219808. The American Consulate, Bergen, Norway, Maurice C. Pierce, consul, also has data regarding the project.

The Ashida Engineering Co., Ltd., Daini, Osaka, Japan, has been appointed agent for the Roller-Smith Co., 233 Broadway, New York, maker of electrical instruments and circuit breakers, in Japan, Korea and Manchuria.

The Franco-British Electrical Co., Ltd., 25 Oxford Street, London, W. 1, is inquiring for a stencil cutting machine for cutting 20 gage steel, brass or copper stencil in at least 3-ft. plates for use in connection with electric advertising signs and window reflectors. After stenciling the edges of the metal should not require trimming by file or any other method and the remaining metal should be without buckle from holding pressure. Quotations should include packing and delivery to the company's Hendon works, London.

THE LAST WORD

(Contributed by the Reader Service Department of The Iron Age Publishing Co.)

"It made such a powerful impression on me that I clipped it and mounted it in my office where all who call may see it." And as he, a member of the party of foreign foundrymen now visiting America, spoke we tried to guess what editorial masterpiece in THE IRON AGE had been so honored.

But each of our three unuttered guesses was wrong, for the speaker continued, "It was an advertisement headed 'SCRAPPED!'" Then he eulogized it for five consecutive minutes.

If you read this Niles-Bement-Pond advertisement in March 4 IRON AGE, page 175, you will agree that the man who wrote it must be endowed with more than a touch of genius.

A kind-hearted gentleman offers to make "mints of money" for us in the oil business. We have had many quaint and queer propositions put up to us but it is a long time since we have been invited to finance an oil well. The invitation is penciled in uncertain chirography on an inexpensive grade of Woolworth stationery, and reads in part:

> Now if you would go into this we could drill one well and *when* it comes in we could sell out to good advantage, as it would raise quite an excitement and then we could go somewhere else and locate a pool, lease the land and drill again, and get money enough to go South or Southwest where gushers are and make mints of money. If you take up this proposition I will smile and then you will smile after awhile.

Notice he does not write, "*If* the well comes in," but "When it comes in." We have always marveled at the optimism of these oil gentlemen with other people's money. But he has underestimated our quickness to smile. This time we smiled first.

"It might surprise you," said a group insurance salesman to me the other day, "to know that a steel mill worker is a better life insurance risk than a bank clerk."

Being properly astonished, I asked him why, and was told that while the accident rate in the steel industry is higher, this is more than compensated for by the fact that the work keeps a man in good physical condition.

Note to steel mill employment managers: Why not advertise, "Don't bother to go to Battle Creek; join us and restore that schoolgirl complexion."

Roger Babson always impressed us as being a Grade A, 24-karat "viewer with alarm." A keen sense of the dramatic and an absence of equivocation have always lent interest to his prophecies.

So we are sorry to see that he is not keeping up with the fashions in economics. He speaks of "possibly a panic" in two or three years. Does he, in support of his contention, discover some brand new bugaboos? No, sir. Though installment buying, the foreign situation and excess manufacturing capacity are just a little passé as economic sores among up-and-coming forecasters, the sage of Wellesley Hills trots them forth as possible panic producers.

This is less than we expected from Mr. Babson. He should have searched more carefully for some of the newer styles in "menaces to our prosperity," beloved of prognosticators, who know that a pessimistic prediction receives fifty times the hearing accorded an optimistic one.

A. H. D.

ELEPHANT BRAND "Phosphor Bronze"

REG. U.S. PAT. OFF.

ELEPHANT BRAND PHOSPHOR BRONZE "S" BEARING METAL BUSHINGS CAST IN THE ROUGH

170 Sizes Carried in Stock for Immediate Delivery

QUALITY IS THE BEST ASSURANCE OF SATISFACTION

Solids Lbs.	Length	Outside Diameter	SIZE OF CORES																					
			Lbs.		Lbs.		Lbs.		Lbs.		Lbs.		Lbs.		Lbs.		Lbs.		Lbs.		Lbs.		Lbs.	
3½	12″	1″	½″	2½″																				
4	12″	1⅛″	⅝″	2¾	½″	3¼																		
4¾	12″	1¼″	¾″	3	⅝″	3½	½″	4																
6½	12″	1⅜″	⅞″	4	¾″	4½	⅝″	5	½″	5½														
7¾	12″	1½″	1″	4¼	⅞″	5	¾″	5¾	⅝″	6	½″	6½												
8½	12″	1⅝″	1⅛″	4¾	1″	5½	⅞″	6¼	¾″	6¾	⅝″	7¼												
9¾	12″	1¾″	1¼″	5¼	1⅛″	6	1″	6¾	⅞″	7¼	¾″	8	⅝″	8½										
11	12″	1⅞″			1¼″	6½	1⅛″	7¼	1″	8	⅞″	8¾	¾″	9	⅝″	9¼								
13	12″	2″			1⅜″	7¼	1¼″	8¼	1⅛″	9	1″	9¾	⅞″	10	¾″	11								
14¼	12″	2⅛″			1½″	7½	1⅜″	8½	1¼″	9½	1⅛″	10	1″	11	⅞″	11¾	¾″	12½						
15½	12″	2¼″			1⅝″	7¾	1½″	8¾	1⅜″	9¾	1¼″	10¾	1⅛″	11¾	1″	12½	⅞″	13						
17	12″	2⅜″					1⅝″	9½	1½″	10¼	1⅜″	11½	1¼″	12¼	1⅛″	13¼	1″	14						
19	12″	2½″					1¾″	10	1⅝″	10¾	1⅜″	12½	1⅜″	13½	1¼″	14¼	1⅛″	15						
21	12″	2⅝″							1¾″	12	1⅝″	12¾	1½″	14	1⅜″	15½	1¼″	16½						
23	12″	2¾″							1⅞″	12½	1¾″	14	1⅝″	14½	1½″	16	1⅜″	17						
25¼	12″	2⅞″									1⅞″	14½	1¾″	15½	1⅝″	17¾	1½″	18¼						
28½	12″	3″									2″	16¼	1⅞″	17¼	1¾″	19	1⅝″	19½	1½″	21	1⅜″	22		
32¾	12″	3¼″									2¼″	17½	2⅛″	18¾	2″	20¼	1⅞″	21½	1¾″	23¼	1⅝″	24		
38¼	12″	3½″									2½″	19½	2⅜″	20¼	2¼″	21¾	2⅛″	22½	2″	25¼	1⅞″	27	1¾″	28½
43	12″	3¾″									2¾″	20¼	2⅝″	21½	2½″	24¼	2⅜″	25½	2¼″	27½	2⅛″	29½	2″	31
49¼	12″	4″									3″	23¼	2⅞″	25½	2¾″	27¾	2⅝″	28¼	2½″	30½	2⅜″	31½	2¼″	33¾
	12″	4¼″									3¼″	24¼			3″	28¾	2⅞″	29¼	2¾″	31¼	2⅝″	33½	2½″	36⅝
	12″	4½″													3¼″	31½			3″	35	2⅞″	34	2¾″	38½
	12″	4¾″													3½″	32¼			3¼″	35½			3″	39
	12″	5″													3¾″	33			3½″	39½			3¼″	43
	12″	5¼″													4″	35			3¾″	42			3½″	46
	12″	5½″													4¼″	38¾			4″	42¾			3¾″	48
	12″	5¾″													4½″	40¼			4¼″	43¼			4″	52½
	12″	6″													4¾″	42½			4½″	46½			4¼″	53½
	Thickness of Walls		¼″		⅜″		⅜″		½″		½″		⅝″		⅝″		¾″		¾″		1″			

SOLIDS ½″ to 4″ dia's CARRIED IN STOCK

ALL 12″ LONG

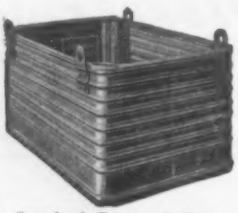
The Figures Shown in the Shaded Columns are Approximate Weights Applying to Each 12-inch Length Bushing

THE PHOSPHOR BRONZE SMELTING CO.

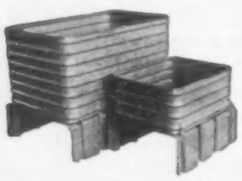
2200 WASHINGTON AVENUE, PHILADELPHIA, PA.

Elwell-Parker Electric Lift Truck Handling Truscon Core Racks at Ferro Machine and Foundry Company, Cleveland, Ohio.

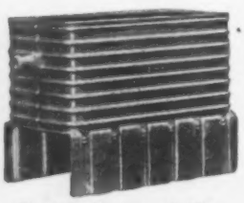
Truscon Platform—note the deep rib reinforcement.



Standard Box and Platform combination.



Truscon Boxes and Platforms in sizes to meet all needs.



Truscon Boxes and Platforms permit heavy handling.

Additional Revenues from Proper Material Handling Equipment

TRUSCON Alloy Steel Boxes and Platforms are designed and constructed for efficiency and durability. They save labor cost, permit material handling in less time, and increase production for hundreds of manufacturers throughout the country. Truscon Boxes and Platforms save huge sums during a year.

Integral rib steel reinforcing, special attachments for crane handling and stacking, caster types. Boxes and Platforms separate or in one unit—thoroughly adaptable to lift-trucks.

Write for free catalog

TRUSCON STEEL COMPANY, Youngstown, Ohio

Special Box and Platform Representatives in New York, Philadelphia, Chicago, Pittsburgh, Cleveland, Buffalo, Detroit, Boston, St. Louis, and Cincinnati.

TRUSCON ALLOY STEEL BOXES AND PLATFORMS

Boxes and Platforms used by Whitin Machine Co., Whitinsville, Mass. Lift trucks are used with Truscon Alloy Steel Platforms and Boxes Tow-Motor hauling train.

BUYERS GUIDE

Advertisements are grouped so that all the advertising on any product or service can be quickly found by referring to the sections listed below

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REPUBLIC

14
Sales Offices
Located at Strategic Points
Are Ready to Serve You

Boston	St. Louis
New York	San Francisco
Philadelphia	Cincinnati
Detroit	Chicago
Birmingham	Pittsburgh
Cleveland	Dallas
Buffalo	Denver

SHEETS — BARS — PLATES — PIPE — PIG IRON
FORMED ROOFING PRODUCTS

REPUBLIC IRON & STEEL CO.

General Offices: REPUBLIC BLDG., YOUNGSTOWN, O.

Naval Equipment Parts

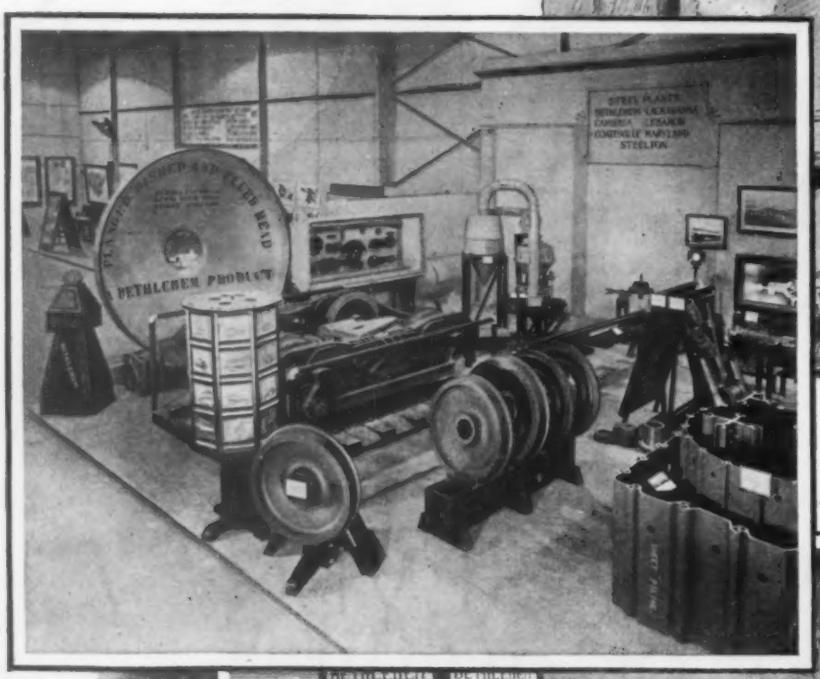
One of a series of advertisements illustrating the many uses of Union Drawn Steels.

THIRTY SEVEN years of quality *and* service have carried the fame of *Union Drawn Steels* around the world.

UNION DRAWN STEEL COMPANY

Beaver Falls, Pennsylvania

The Bethlehem



BETHLEHEM

Exhibit at the Sesqui-Centennial Exposition

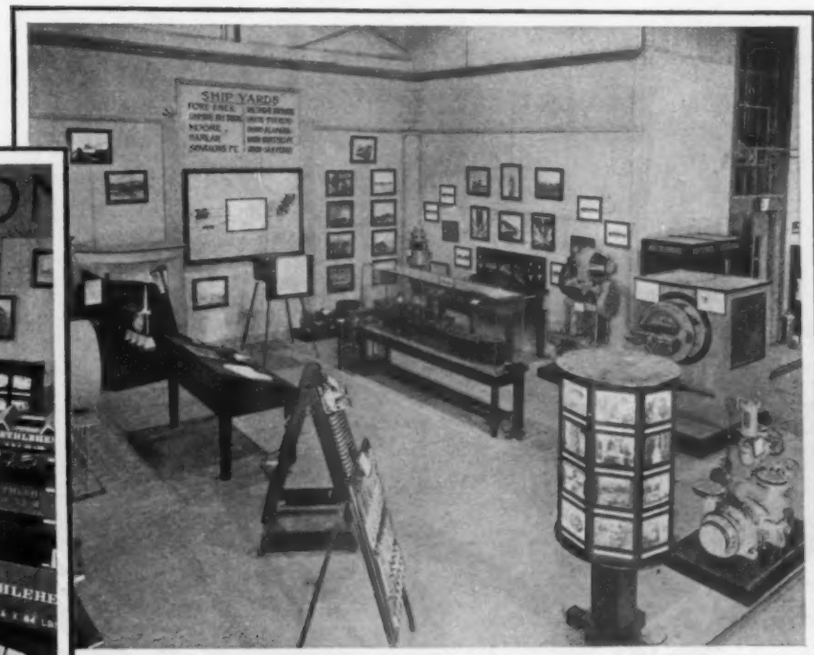
WE CORDIALLY invite you to visit our exhibit in the Mines, Metallurgical and Transportation Building at the Sesqui-Centennial Exposition in Philadelphia. We have endeavored to make our display one that will be of interest to those associated with the iron and steel and allied industries, and to users of iron and steel products, and at the same time of educational value to visitors in general.

Our display includes not only a great diversity of rolled steel products but also examples of various types of special machinery and equipment manufactured by Bethlehem, as well as photographic views of manufacturing operations and processes.

A visit to our exhibit offers a fine opportunity to obtain a definite idea of the great variety of products manufactured by Bethlehem Steel Corporation.

Our representatives will take pleasure in giving you any information desired.

BETHLEHEM STEEL COMPANY
General Offices: BETHLEHEM, PA.



District Offices: New York Boston Philadelphia Baltimore Washington Atlanta Pittsburgh Buffalo Cleveland Detroit Cincinnati Chicago St. Louis San Francisco Los Angeles Seattle Portland

Bethlehem Steel Export Corporation, 25 Broadway, New York City
Sole Exporter of our Commercial Products

BETHLEHEM

Alloy Steels Speed the World's Progress

THE farmer's automobile takes him to market—and back—in the time it used to take Old Dobbin to get to the first watering-trough. The city dweller depends upon trolley, tube or "L" to get him to his day's work. Goods are moved by train or truck more quickly and surely than ever before.

Because flawless mechanisms turn and spin on tracks or highways — delivering power when and as wanted—travelers arrive on time and as promptly depart. Alloy Steels have made dependable transportation a reality.

For stress members and moving parts of vehicles of every kind, engineers have recommended various types of Alloy Steel. To meet the need for a material that is strong but light, tough but elastic, adaptable to the many different requirements, these metallurgists have chosen Alloy Steel. With from 25% to 100% greater loading capacity than carbon steels, and with more hardness and strength per unit of cross-section, Alloy Steels have a shock resistance that is remarkable. They endure where other metals fail.

Alloy Steels are necessary to the engineering plans of industry, everywhere. They will fit into YOUR plans. Why not let our engineers tell you how and where Alloy Steel can help in the solution of your metal problems. Our laboratory facilities are at your disposal.

In the famous Mack trucks made by The International Motor Company of New York, Nickel-bearing Steels have been used for such vital parts as: frames; axles; steering knuckles, arms, pins, worms, and gears; spring clips; cam shafts, and rollers; transmission, differential, and double reduction gears; jack shafts, and rear axle drive shafts.

Send for this permanent binder containing valuable data on Nickel Steels—their properties and applications. Mention this magazine in writing.

ALLOY STEEL

INCO NICKEL

THE INTERNATIONAL NICKEL COMPANY, 67 WALL STREET, NEW YORK CITY.
Producers of INCO Nickel in all commercial forms

INCO NICKEL

QUALITY

Vary Mould Design for Special Steels

THE unmistakable swing toward specialization of steel necessitates varying the ingot mould design in accordance with the character of the steel.

SERVICE

Valley Mould and Iron Corporation

MAIN OFFICE—Sharpsville, Pa.

WESTERN OFFICE—{ 108th St. & Calumet River, South Chicago, Illinois

PLANTS—{ Sharpsville, Pa. South Chicago, I

Unexplored Possibilities In Design

IN somebody's drawing office—yours perhaps—a new machine, some new type of plant, is being drafted to the order of a firm who are difficult to please—customers you wish to retain.

Specifications are well advanced and yet—are the materials perfect for the duty? Is any possibility unexplored?

How about the effect of corrosion on that pump impeller—on that sleeve or container? How will that tube, or this valve withstand the insidious canker of corrosive vapors or impure water?

Will corrosion ultimately cause bad working and breakdown of this plant from which so much is expected?

If so, vital possibilities affecting your very prestige perhaps — have been unexplored, simply because these details in the corrosion zone have not been specified as of

FIRTH STAINLESS **STEEL.**

SHEETS
BARS
STAMPINGS

CASTINGS
FORGINGS
WIRE

DIRECT AND ONLY U. S. AGENCY

THOS. FIRTH and SONS, Inc.

JOHN J. COLEMAN, General Manager

185 ALLYN STREET, HARTFORD, CONN.

Works—Thos. Firth & Sons, Ltd., Original Makers, Sheffield, England

CARPENTER CARPALOY

Corrosion-Resisting Steels

CARPALOY No. 1 (Stainless Iron)

CARPALOY No. 2 (Stainless Steel)

CARPALOY No. 3 (Rustless Steel)

In billets, hot-rolled bars, rings, discs, forgings, strips, cold-rolled and cold-drawn bars, polished drill-rods, etc.

Circular on Request

THE CARPENTER STEEL COMPANY
READING, PA.

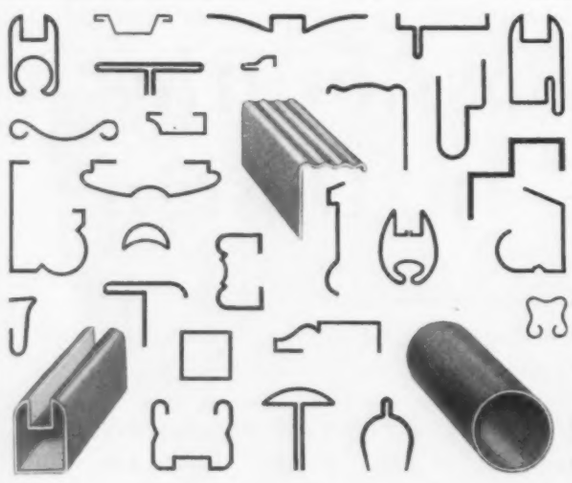
SALVAGEABLE!

—or Permanent Walls

R. C. CONCRETE BEAMS ARE 100% SALVAGEABLE

This photograph shows R. C. Reinforced Concrete Beams set up ready for filling in. They are used here to form a *permanent* railroad embankment. But these same beams can be used again if this embankment is ever changed. These beams are permanent or 100% salvageable at will. They cost 50% less than solid walls. Write for a booklet.

THE R. C. PRODUCTS COMPANY, Inc.
ENGINEERS BUILDING CLEVELAND, OHIO
Chicago Office: 568 Peoples Gas Bldg., Chicago, Ill.
New York Office: 293 Pearl Street, New York City



COLD ROLLED
MOULDINGS
AND ARCHITECTURAL SHAPES

In gauges from .005 to .187

Formed into any shape from most any metal

THE
Kawneer
COMPANY

1014 FRONT ST., NILES, MICH.

Ljusne Woxna Co., Ltd.

LJUSNE—SWEDEN

LTS MELTING BARS

C	0.03 —0.06 %
S	0.005—0.007%
P	0.015—0.018%

THE WORLD KNOWN BRAND
OF
SWEDISH CHARCOAL IRON

New York Sales Office:
52 West Street

As You May Have Noticed

we do not attempt to magnify our own importance in the scheme of things. But our object is not to get ourselves talked about, but rather to demonstrate that we are at least a reasonably reliable house to deal with.

The FITZSIMONS CO.

"A good concern to do business with"

YOUNGSTOWN, OHIO

Cold drawn screw steel and shafting. Rounds, squares, flats, hex., and special shapes.

Special "High Grade"

Basic Open Hearth Steel

FORGING BILLETS

NICKEL
CHROME NICKEL
VANADIUM
CHROME VANADIUM
CHROME

SHEET BARS
SLABS
Special Steel for All Purposes

ANDREWS STEEL CO.

Newport, Ky.
U. S. A.

District Sales Office
1040 McCormick Bldg., Chicago

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Buying Satisfaction Rests on Confidence
Years of meritorious service protect you when you place your confidence in Illinois Steel.
Illinois Steel Company
General Offices 208 So. La Salle St.
CHICAGO, ILLINOIS

Light Steel Hoops

⅜" to 1½" wide, Nos. 20 to 30 gauges, inclusive; Blue, Black, Painted or Galvanized, in coils or cut to length.

Large Stock on Hand

These Hoops are dead soft, suitable for packing hoops, baling cloth, waste and other commodities; bundling lumber, shingles, etc.; reinforcing baskets, boxes, hampers, and kindred purposes. Packed in various forms to suit local conditions. Special Embossed and Perforated Straps, Stretching and Sealing Tools, and protective devices for every sort of container.

DeHAVEN MANUFACTURING CO.
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Tel. 5620-5621 Main

INLAND WIRE PRODUCTS COMPANY
2001 Pershing Place Chicago, Ill.

E. McMILLAN & CO.
522-524 Beatty St. Vancouver, B. C.

GULF STATES STEEL COMPANY

BIRMINGHAM, ALA.

"SOUTHERN" BASIC OPEN HEARTH STEEL AND WIRE PRODUCTS—Nails, Staples, Smooth Wire, Bale Ties, Barb Wire, Woven Wire Fence, Wire Rods, Billets, Merchant Bars, and Concrete Reinforcing Steel.

PACIFIC COAST STEEL COMPANY

Manufacturers of Open-Hearth Steel Products

STRUCTURAL SHAPES — MERCHANT BARS — UNIVERSAL MILL PLATES — TIE PLATES — SPECIAL SHAPES — FORGING INGOTS AND BILLETS — TRANSMISSION TOWERS

PROMPT, COURTEOUS SERVICE

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Stroh Steel
ROLLING MILL EQUIPMENT

We are founders of extraordinary castings for Rolling and Blooming Mills. Over 1,000,000 tons rolled with one STROH Steel Mill Pinion.

Greater Wearing Service Per Unit of Cost Guaranteed

STROH STEEL-HARDENING PROCESS CO.

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PITTSBURGH, PA.

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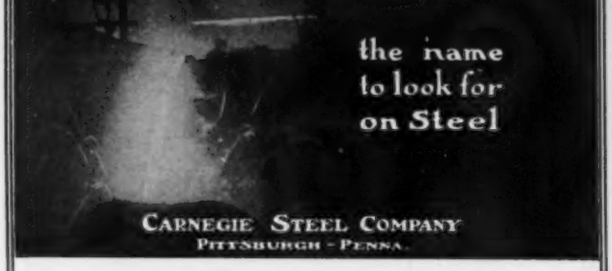
-Carnegie-



the name to look for on Steel

CARNEGIE STEEL COMPANY
PITTSBURGH - PENNA.

HELLER STEELS

Standard and Special Shapes

HIGH SPEED, DIE AND SPECIAL
TOOL STEELS
SOLID AND HOLLOW DRILL STEEL
SPECIAL ALLOYS

We also make Rasps, Files (Vixen and Commercial) and Hammers

See our Exhibit at Sesquicentennial International Exposition.

HELLER BROTHERS CO.
805 Mt. Prospect Ave.
Newark New Jersey

Good Tools since 1836

Hot Rolled Steels

Electric and Open Hearth
Tool—Alloy—Carbon

Bars, Special Shapes,
High Carbon Wire Rods

Cold Rolled Strip Steel

Driver-Harris Company
Harrison, N. J.

HIGH CARBON COLD ROLLED
STEEL
ANNEALED AND TEMPERED

FOR PHONOGRAPH, CLOCK AND GENERAL SPRING PURPOSES

HUNDREDS OF SIZES IN STOCK
QUICK DELIVERIES

THE WALLACE BARNES CO.
BRISTOL, CONN.

TENNESSEE

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Coal, Iron & Railroad Company

OPEN HEARTH
Steel Products

Standard and Light Rails
Angle Bars, Track Bolts, Track Spikes, Tie Plates, Bars, Plates, Shapes, Axles, Forgings
Steel Castings, Semi-finished Material, Pig Iron.

GENERAL OFFICES: Brown-Marx Bldg., Birmingham, Ala.
Branch Offices—Boston, Buffalo, Chicago, Cincinnati, Cleveland, Denver, Detroit, New Orleans, New York, Philadelphia, Pittsburgh, St. Louis, St. Paul.
Pacific Coast Representatives—United States Steel Products Company, San Francisco, Seattle, Portland, Los Angeles
Export Representatives—United States Steel Products Company, New York City.

SWEDISH STEELS OF EVERY DESCRIPTION

Direct Mill Service

QUICK IMPORT SHIPMENTS—KLOSTER Tool Steels (carbon and alloy) Hollow Drill Steel — Ball Bearing Steel—Ball Steel—Chrome Nickel—Chrome Vanadium—High Speed Steel—Magnet Steel—Cutlery Steels—Band Saw Steel—Razor Blade Steel—Spring Steels—Hot and Cold Rolled Strip Steel—Band Iron, Wire Rods, Rolled Wire, Charcoal Pig Iron, Hollow and Solid Staybolt Iron.

CHICAGO WAREHOUSE

Kloster Steels from STOCK—Tool Steel (carbon and alloy) Hollow Drill Steel—"SWED-OIL" Non Shrinking Steel—"MAX-I-MUM" Alloy Steel—for Pneumatic Tools, "RAM" BRAND Genuine Swedish Iron.

KLOSTER STEEL CORPORATION

1036 W. LAKE ST., CHICAGO

HY-TEN

"B" TEMPER No. 5 ANALYSIS

ONE OF OUR STANDARD GRADES

HY-TEN "B" 5 contains .95 carbon with a small percentage of chrome which makes it tougher than straight carbon analysis. It is designed for water-hardening, enabling you to obtain 80-90 scleroscope without danger of cracking. This grade is suitable for Lathe-Centers, Collets, Arbors, Screw Drivers, Nail Sets, Hammers, Vise-Jaws, and straightening Rolls.

WHEELOCK, LOVEJOY & CO., Inc.
CAMBRIDGE NEW YORK CLEVELAND CHICAGO

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BLOOM STAYBOLT IRON
XX ENGINE BOLT IRON
IRON FORGING BLOOMS
BAR AND BAND IRON

PRODUCTS MANUFACTURED FROM GENUINE PUDDLED PIG IRON
LOCKHART IRON & STEEL CO.
PITTSBURGH, PA.
VULCAN

COLD ROLLED
STRIP STEEL
SCREW STOCK
NEEDLE WIRE
SHAFTING

WETHERELL BROS. CO.
251 ALBANY ST., CAMBRIDGE, MASS.
STEEL

OPEN HEARTH
SPECIALTIES
DIE BLOCKS
TOOL STEEL
DRILL RODS
CUTLERY STEEL

The Athenia Steel Co.
135 William Street, New York Works: Athenia, N. J.
Makers of High Grade Tempered and Polished Steel for Clock, Watch, Motor and Typewriter Springs, and Tempered and Untempered Steel for other purposes. Special quality equal to finest imported—both for finish and accurate rolling.
Western Agents—La Salle Steel Co., 2305-25 S. Halsted Street, Chicago, Ill.
New England Agents—Wetherell Bros. Co., 251 Albany St., Cambridge, Mass.

Open Hearth Alloy Steel Ingots, Billets, Bars
Wire Rods, Wire, Nails, Rivets and Cut Tacks
Iron Bars and Railroad Tie Plates
Interstate Steels
INTERSTATE IRON & STEEL CO. 104 So. Michigan Ave. CHICAGO

Rock Drill Steel
(Solid and Hollow)
Tool and Die Steel
Polished Drill Rods

PATRIARCHE & BELL
STEEL
351 West St. New York

Spring Steel
Bars and Sheets
Music Wire
Cop'd Bess. Rods

Gathmann Methods
Assure Clean Sound Steel
Write for Booklet
THE GATHMANN ENGINEERING CO.
BALTIMORE, MARYLAND

HIGH GRADE COLD DRAWN STEELS
Rounds, Squares, Flats, Shapes
DRILL RODS
Assured quality and service
Pittsburgh Tool Steel Wire Company
Monaca, Pa.

STEEL *of Every Description*
HAWKRIDGE BROTHERS COMPANY
303 CONGRESS STREET, BOSTON, MASS.

DRILL RODS
GLOBE POLISHED - BLUE CHIP HIGH SPEED
QUALITY - ACCURACY - UNIFORMITY
GLOBE WIRE COMPANY
SHARPSBURG, PA.

SVEA SWEDISH IRON
Swedish Iron & Steel Corp.
Brooklyn Chicago

U-LOY STEELS
SPECIAL ANALYSIS AND ALLOY STEELS FOR ANY REQUIRED PURPOSE — ELECTRICAL, AUTO-BODY AND METAL FURNITURE SHEETS

TONCAN METAL
COMMERCIALLY PURE IRON ALLOYED WITH COPPER TO OBTAIN THE GREATEST POSSIBLE RESISTANCE TO RUST AND CORROSION

UNITED ALLOY STEEL CORPN. CANTON, OHIO

SEACO
HOLLOW and SOLID DRILL
STEELS
GAS ARC WELDING RODS
STULZ-SICKLES CO.
NEWARK, N. J.

NICETOWN PLATE WASHER CO., Inc.
IRON AND STEEL BARS
DEFORMED BARS, THREADED RODS WITH NUTS
PUNCHED BARS OR PLATES
AWNING RODS, STEP IRON, CAST IRON WASHERS
GALVANIZED BARS AND WASHERS
JUNIATA AND CLARISSA STS.
NICETOWN, PHILADELPHIA, PA.

INGOT MOLDS

The Penn Mold & Manufacturing Co.
WORKS: DOVER OHIO — OFFICE: WHEELING, W. VA.

MANGANESE STEEL
THE FIRST ERA STILL LEADS IN QUALITY
STEEL

Think of This Trade Mark
when you require
PIG MACHINE PARTS
or MILL CASTINGS
that must stand hard service.
ERA
STEEL CO.
Bucyrus, Ohio

AN IRON THAT RESISTS
RUST-ACID-CORROSION

So much so, in fact, that it is used for nitric acid containers, turbine buckets, blades, coal mine equipment, marine hardware, and sporting goods.

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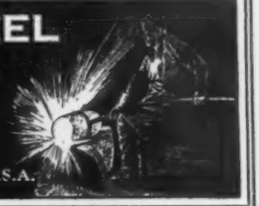

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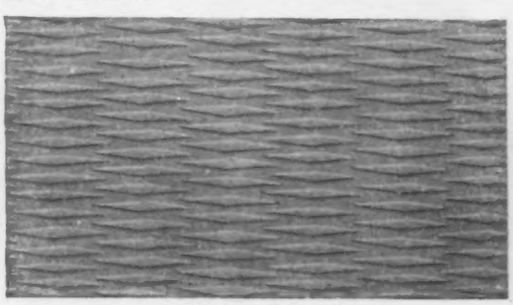

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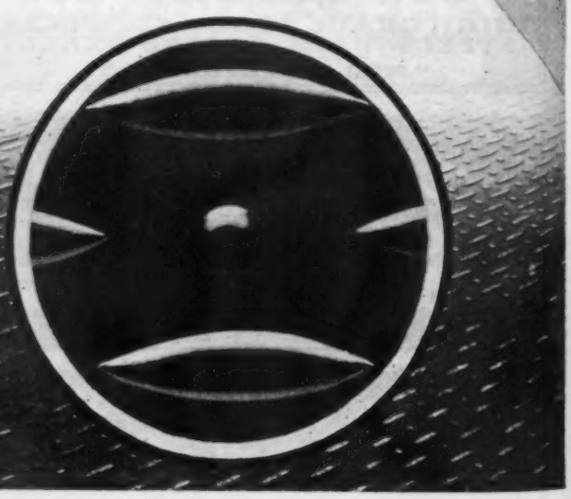

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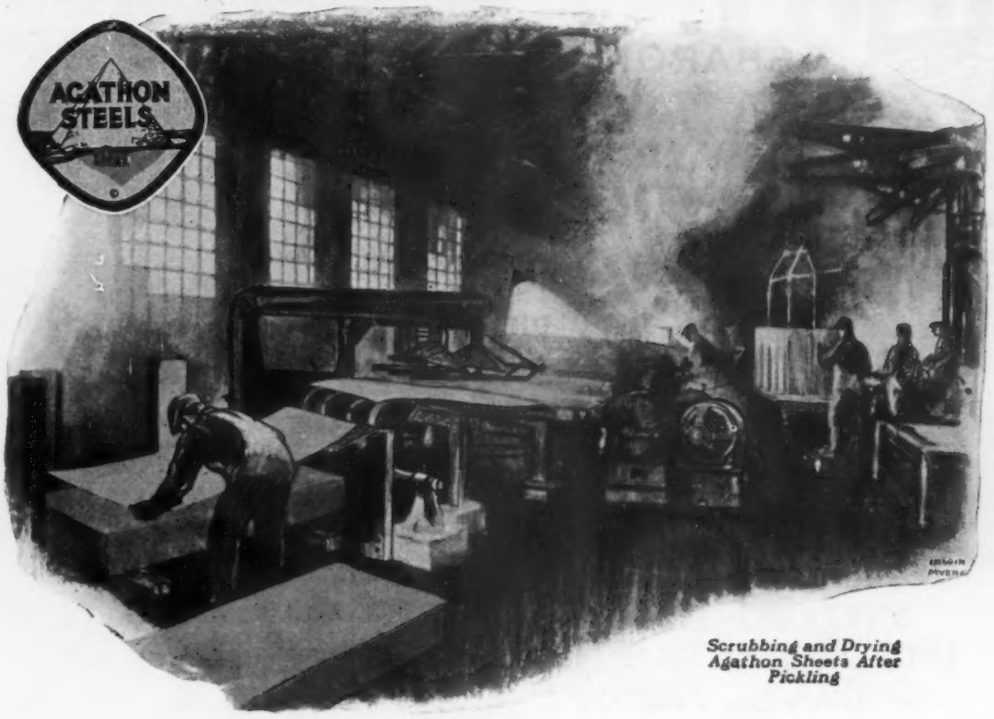

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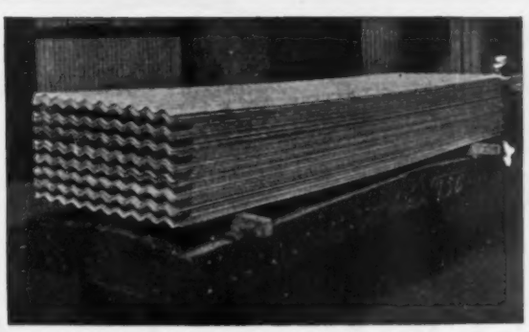

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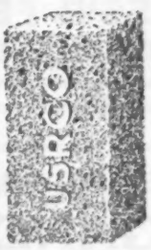

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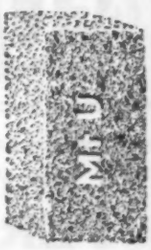

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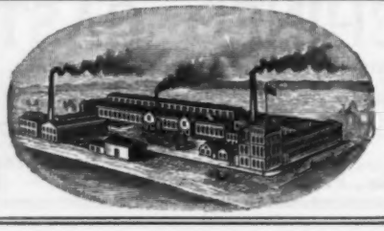

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STERLING DIE CASTING CO., INC.
741 39th Street Brooklyn, N.Y.
Detroit Office 8242 Woodward Ave.

SPECIAL STAMPINGS

Small or large metal stampings from .005" thick to 1" in thickness in steel, brass, copper, aluminum, etc.
Redesigning castings and forgings into stronger and lighter stampings a specialty.
Complete facilities for welding, enameling, plating and finishing your work.
Quotations furnished promptly. Send us your prints.

THE BOSSERT CORPORATION, Utica, N. Y.
80 Church Street, New York City; 605 Swetland Bldg., Cleveland, Ohio; 1017 Ford Bldg., Detroit, Mich.

BOSSERT
for Stampings
Large & Small

Make Your Own Die Castings

New Semi-Automatic reduces cost 25%-40%. You can make your own cheaper than you can buy and machine castings from brass, bronze or iron. Send for estimates, enclose blue prints or send samples. See our advertisement in second issue of each month.

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Specialists in Metal Goods

Metal goods to order from Brass, Zinc, Aluminum, Steel. Drawn work, stampings, assembled parts or completed articles. All finishes. Estimates furnished.

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We cast in Aluminum, Tin, Lead and Zinc base alloys. Estimates made from samples, drawings, or blue prints. Send for booklet.

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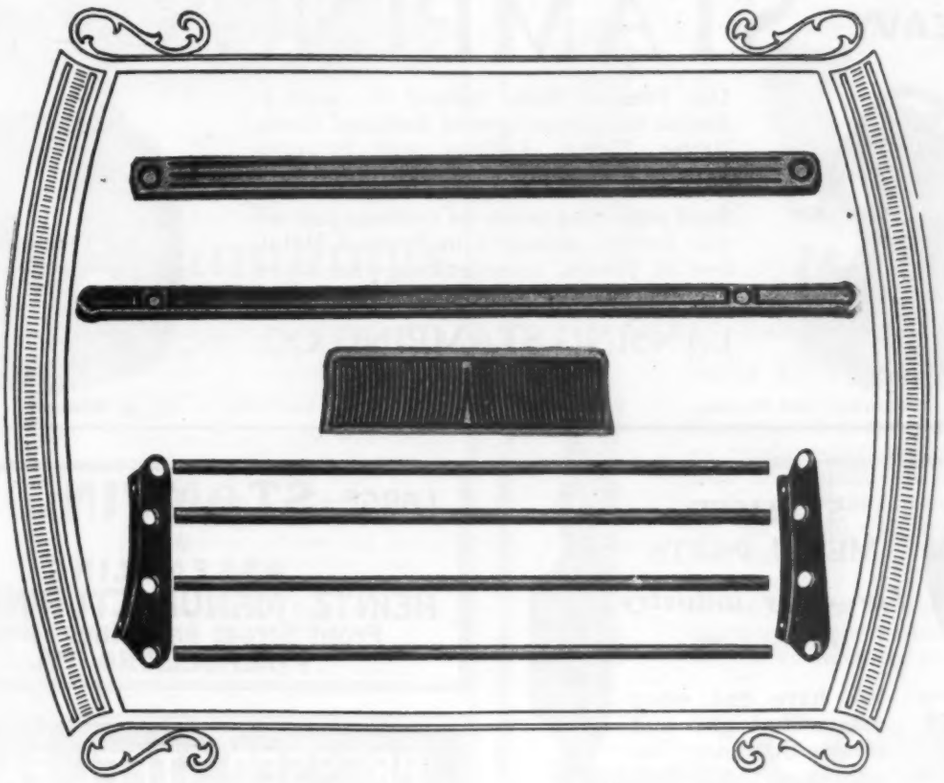
STAMPINGS
Die Makers
THE E. KONIGSLOW STAMPING & TOOL CO.
Cleveland, Ohio.



The Birthplace of Three Non-Ferrous Motor Car Stampings

Non-Ferrous Light Stampings

Brass Copper Aluminum and Alloys

Stamped panel bars, scuff plates and trunk racks, for automobiles, were born right here at the Wheeler plant. Their wide adoption by many leading builders has proved their success. This is also true of a number of other products.

Redesign—or slight changes in present designs—involving the use of Non-Ferrous Stampings, produces:

(1) A more salable product
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Why not ask our engineering department for suggestions? No obligation.

THE WHEELER RADIATOR & MANUFACTURING CO.

1637 Collamer Ave., Cleveland, Ohio

64 Marvel Road, New Haven, Conn.

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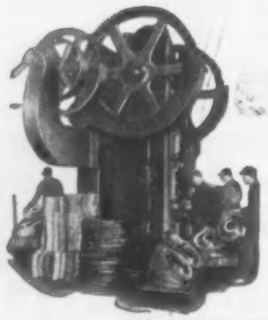
HEAVY **STAMPINGS** MEDIUM



Use Pressed Metal instead of castings! Secure the advantages of Reduced Costs, Better Finish, Lighter and Stronger Construction and Standardization.

Send your blue prints or castings and we will furnish redesigns in Pressed Metal, free of charge, incorporating the above advantages.

LANSING STAMPING CO.
Lansing, Michigan
CHICAGO: 4554 Broadway DETROIT: 8674 Woodward DAYTON, O.: 237 N. Wilkinson

WORCESTER STAMPED METAL © "QUALITY" STAMPINGS

STAMPED METAL PARTS
For every industry
Established 1883

We have had many years of Light and Heavy Stamping Experience. We offer you the benefit of our knowledge and equipment.

WORCESTER STAMPED METAL CO.
WORCESTER, MASS.

LARGE—**STAMPING**—SMALL
and
ASSEMBLING
HEINTZ MANUFACTURING CO.
Front Street and Olney Avenue
PHILADELPHIA, PA.

PRESSED STEEL PARTS
30 YEARS EXPERIENCE
THE AMERICAN PULLEY CO.
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DETROIT STAMPING CO
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Harry Brothers Manufacturing Co.
STAMPINGS
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STAMPINGS
DIES & TOOLS
COMPLETE PLANT
OVER 30 YRS. EXPERIENCE
The OTTO KONIGSLOW MFG. Co.
CLEVELAND — OHIO

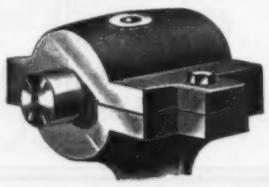
STAMPINGS
ALL — MATERIALS
— SHAPES
— FINISHES
MATTHEWS MANUFACTURING CO.
1890 WORCESTER, MASS. 1926

Bettcher
PRESSED METAL STAMPINGS
Stampings in all metals, from small to large
THE BETTCHER STAMPING & MFG. CO.
3108 West Sixty-first Street Cleveland, Ohio

To keep on growing, keep on learning. To keep on learning, read your business paper carefully each week.

Bennett Hendy-Top Oil Cup

Made in sheet steel or brass, these oil cups show the accuracy of all Bay State Stampings.
We make other specialties and are in position to produce promptly high grade stampings to your specifications. Write us about your needs.



BAY STATE STAMPING COMPANY
380 Chandler St. Worcester, Mass.

Change to Stampings

Continuing to use castings and forgings for parts that could be made of pressed metal is like preferring to ride in horse cars.

It is slower, and in the long run costs more. We are willing to show you how you could redesign certain parts to be made of stampings, and thus cut your production cost and improve the appearance of your product at the same time.

Our ability to help you is wrapped up in 45 years of experience. A fully equipped 15 acre plant is at your service. Use G. P. & F. stampings.

Be sure to consult us.

G.P&F SERVICE
KNOWING HOW SINCE 81

Geuder, Paeschke & Frey Co.

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A Better Looking Product Sells Better—

The type of pressed metal parts we produce improves the appearance and quality of every product in which they are used. They cut the production cost of those products, too.

If you will get in touch with our engineers we are quite sure they will do as much for your product.

THE METAL SPECIALTY COMPANY

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CROSBY STAMPINGS

Send us your stamping problems; our 25 years' experience will help solve them.
Consult Our Engineers.

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HARDENING - PLATING - LACQUERING
ASSEMBLING

ESTABLISHED 1890

THE H. A. MATTHEWS MFG. CO., Seymour, Conn.

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Machine Screws
Stove Bolts, Tire Bolts

American Screw Company

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WESTERN DEPOT:
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Wood Screws

BRIDGEPORT SCREW CO.
BSCo.
BRIDGEPORT, CONN.

THE BRIDGEPORT SCREW CO.

Bridgeport, Conn.

Representatives:
George E. Quigley, Detroit
Milton Pray Co., San Francisco, Los Angeles, Seattle
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About better machine screws

Actual vs. estimated cost—are yours the same? The assembling room often swallows the profit on efficiency in other departments.

HUBBELL MACHINE SCREWS are made to fit—the assembling may be done accurately at high speed and low cost.

HARVEY HUBBELL INC
MACHINE SCREWS
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NEW YORK, N.Y.
30 EAST 42ND ST.

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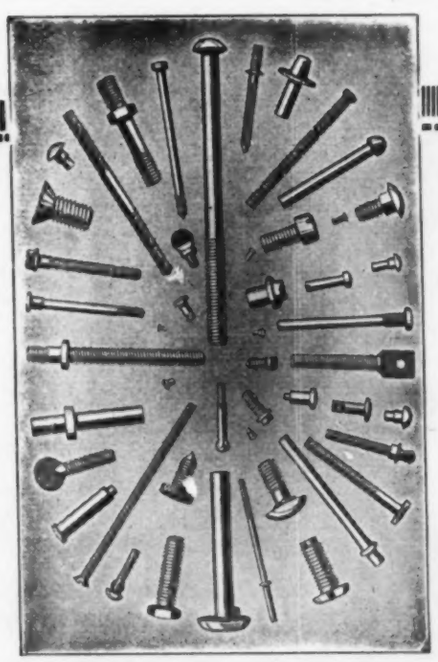


PERHAPS a great many of your parts that are at present made from the bar could be produced by our process. It is to your interest to investigate.

MACHINE SCREWS
MACHINE SCREW NUTS

Rivets to Order Only
From All Grades of Material

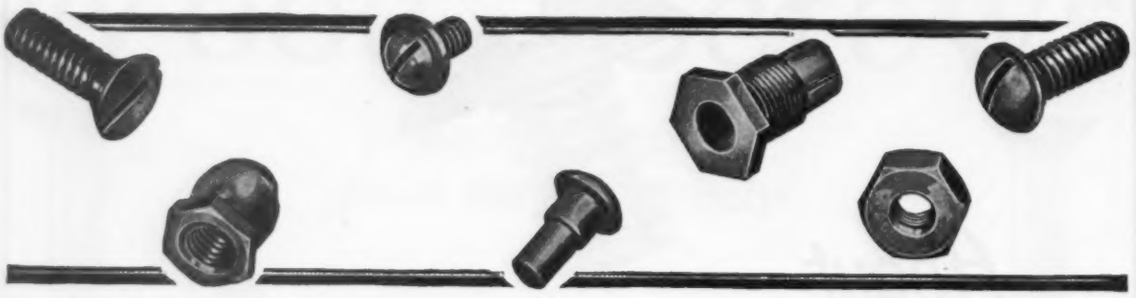
"Promco" Quality Brand of Interchangeable bolts and nuts to A. S. M. E. Specifications.

Binding head, Washer head, and special screws for Electrical requirements is one of our specialties. Their uniformity of construction insures you against slowing down in your assembly operations.

The priceless ingredient of every product is the honor and integrity of its maker.

THE PROGRESSIVE MANUFACTURING COMPANY
TORRINGTON, CONNECTICUT, U. S. A.

Since 1849



Screws, Nuts, Screw Machine Products

You can rely upon these products to the utmost. We have for over three-quarters of a century pleased the most critical. Let us show you how well and how speedily we can take care of your needs.

Threaded Wires, Special Rivets, Formed Wires and a variety of special parts from wire and rod are also produced by our organization. Tell us what you need.

The Blake & Johnson Co., Waterbury, Conn.

MACHINE SCREWS
SCREW MACHINE PRODUCTS

WIRE FORMING
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hollow set and sockethead cap

SCREWS

won't fracture
heads won't round out
points won't mushroom

Made of special steel, heat-treated by Standard's own private process.

Get free samples for testing. Then get prices—*Unbrako screws cost less!*

Standard PRESSED STEEL COMPANY
The Pioneer Steel Hanger People
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ALLEN Safety Set Screws

30% extra strength over broached hollow screws—the only other kind made. By a patented process we increase the density of the steel around the socket-holes, so that even the smaller sizes will stand all the strain the best made wrench can apply. The Allen process makes deep, perfectly-formed socket-holes—no chips in the bottom. The entire length of the ALLEN is utilized either for solid metal at the point, or depth of socket for the wrench. All sizes in stock from ¼ to 1½ in.; any length, point or thread. Also Pipe Plugs, Socket-Head Cap Screws, Tap Extensions and Socket Wrenches—Allen process. Descriptive catalogue on request.

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Special Bolts and Nuts

Coach Screws

In addition to coach screws we make bolts and nuts to meet every requirement. Tell us your needs. Our 45 years' experience and our adequate facilities will take care of the most unusual demands.

PAWTUCKET MANUFACTURING COMPANY
PAWTUCKET, R. I. DEPT. "C"

A Grip That Cannot Slip!

A 150 pound man at the end of a four-foot wrench, operating a standard testing machine, was not sufficient to break a MAC-IT Standard Hollow Set Screw.

Note the pressure exerted on this screw —17980 pounds—as shown by the weight on the beam. Even at this excessive pressure the Mac-it Hollow Set Screw remained as perfect as before.

All Mac-it screws are like this. Mac-it special alloy steel from which they are produced and the scientific heat treatment given them insure uniform strength and toughness throughout their structure. Built for hard service.

THE STRONG, CARLISLE & HAMMOND CO.

All types
All sizes
Set Screws
Cap Screws

General Distributors
CLEVELAND, OHIO

Mac-it
Hollow
Set Screw

Screw Machine Products

Our work pleases the "hard to please"
Try Us

BROWN McLAREN MFG. CO.
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The Cleveland Cap Screw Company
Manufacturers
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Quality Stock for Immediate Shipment
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Screw Products

We manufacture a complete line of Screws, Bolts, Escutcheon Pins and Chain, also Special Screw Machine Products. Quotations promptly and gladly furnished.

CORBIN

CORBIN SCREW CORP.
American Hardware Corporation
Successor
226 HIGH STREET
NEW BRITAIN CONN.

WM. H. HASKELL MFG. CO.

Pawtucket, R. I.

Established 1820

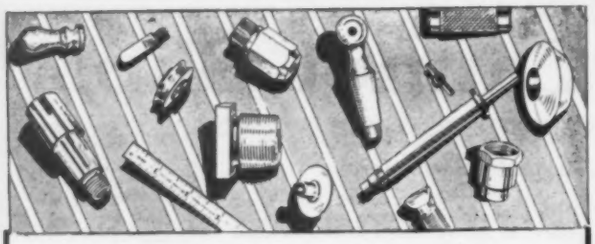
SCREW MACHINE PRODUCTS
3/16" to 1½" Diameter

Very accurate work, finished or semi-finished, heat treated or untreated.

Also Bolts, Nuts and Screws of Special Alloy Steels.

Send your specifications.

"Over A Century of Production"



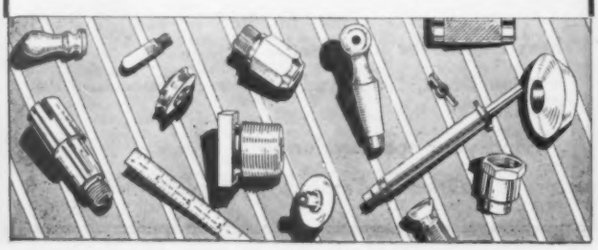
Thousands of satisfied customers come back to NAMCO on their repeat orders for special screw machine products because they have found there a fixed desire to give them parts that best serve their needs. Courtesy, fairness and good will are present in every transaction.

A large stock of standard cap and set screws, plain and castellated nuts is carried for prompt shipment.

We are fully equipped to furnish special screw machine products to sample or blueprints with a definite understanding that the parts you get from NAMCO will fit snugly where they belong.

May we handle your next order?

THE NATIONAL ACME CO.
CLEVELAND, OHIO
Standard and Special Screw Machine Products
Automatic Screw Machines



MICHIGAN
SCREW MACHINE PRODUCTS

EVEN though our screw machine products have always been considered mighty good we still try to make them better. We will try just as hard on yours. Write for an estimate.

Capacity 1/16" to 5".

Sherardizing—Hardening—Grinding

MICHIGAN SCREW CO.
LANSING MICHIGAN

SCREW MACHINE WORK

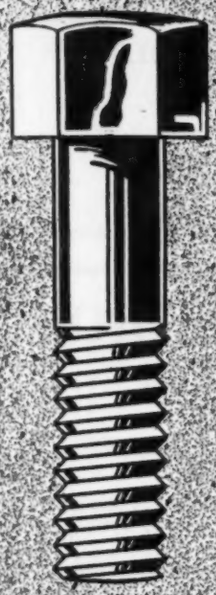
Special parts turned from Brass, Steel and Iron, also Manufacturers' Specialties.
The best equipped shop in Greater New York.
Your work will be handled by Brown & Sharpe and National Acme Automatics.
You can depend upon our delivery to keep your production schedules straight.

Ericsson Screw Machine Products Co., Inc.
610 Bergen St. Brooklyn, N. Y.

SPECIAL SCREW MACHINE PRODUCTS
Any Metal
Close Tolerances

THE WALLACE BARNES CO
"Spring Makers for Three Generations"
BRISTOL, CONNECTICUT

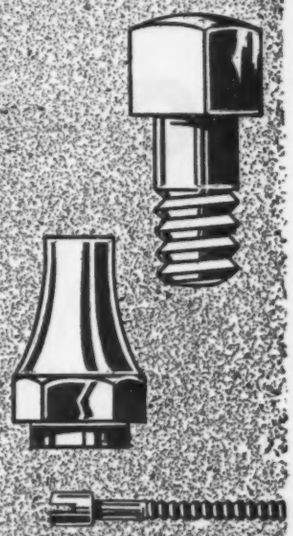
SHIMER



ABSOLUTELY DEPENDABLE SCREW MACHINE PRODUCTS

Thru many years of good times and poor times we have always supplied our customers with absolutely dependable screw machine products. That is why these customers "stick." They realize that a thoroughly reliable source of supply has a value ahead of other inducements.

Let us quote on your requirements in steel, brass or iron.



SAMUEL J. SHIMER & SONS, INC.
MILTON PENNSYLVANIA

Screw Machine Products

CAP and SET SCREWS

The Wm. H. Ottemiller Co., Inc.
Pattison St. and M. & P. R. R., York, Pa.

"AUTOMATIC SCREW MACHINE PRODUCTS"

"HEAT TREATED STEEL PRODUCTS"

SCREW MACHINE PRODUCTS

ACCURATELY MADE AT A FAIR PRICE ARE MORE ECONOMICAL

Specialists in the production of screw machine products for 15 years. Let us quote on your requirements.

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ALL KINDS OF BOLTS

Nuts, Washers, Lag Screws, Rivets, Hook and Eye Bolts, Forgings, etc., either plain or galvanized. Try us today.
Prompt shipments everywhere.

200 RUBY STREET ROCKFORD, ILLINOIS

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From ⅛ to 1¾" in Diameter
ACCURATE WORK
PROMPT SERVICE
Let Us Quote on Your Requirements

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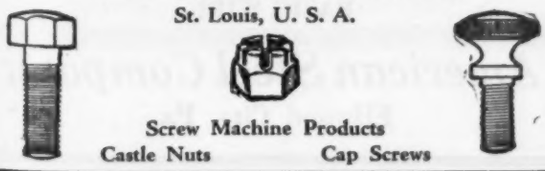

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Castle Nuts Cap Screws

TRACK BOAT TRACK IRON **SPIKES BOLTS BARS** DOCK GUARD MACHINE STEEL

W. Ames & Co., Est. 1859
Factory & Office Jersey City, N.J.

DROP FORGED WELDLESS

EYE BOLTS

ROLLED THREAD

GALVANIZED OR PLAIN

½"	DIAM. WITH EYE			7/8"	INSIDE
5/8"	"	"	"	7/8"	"
3/4"	"	"	"	1 3/8"	"
1	"	"	"	1½"	"

QUICK SHIPMENT

OLIVER IRON AND STEEL CORP.

1001 MURIEL ST.,
PITTSBURGH, PA.

ESTABLISHED 1863

RHODE ISLAND TOOL COMPANY

NUTS, BOLTS, SCREWS AND DROP FORGINGS

PROVIDENCE, RHODE ISLAND

Established 1872 Incorporated 1898

POTTSVILLE BOLT COMPANY

MANUFACTURERS OF

Small Railroad Spikes, Machine, Track, Carriage, Countersunk Head and Anchor Bolts, Lag Screws, Tie Rods, Etc.

PROMPT DELIVERY

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MALLEABLE IRON

Thumb Nuts and Thumb Screws

Formerly made by Thomas Devlin Mfg. Co., Philadelphia

We carry a large stock and variety of styles and sizes of thumb nuts and thumb screws, threaded and blanks.

Malleable and Grey-Iron Castings

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9th & Jefferson Sts., Philadelphia, Pa.

Buffalo Bolt Co.

North Tonawanda, N. Y.

BOLTS, NUTS, LAG SCREWS
STEEL BARS, WIRE

of exceptional quality

SALES OFFICES:
Chicago Detroit Kansas City

Using

PALNUTS

will insure repeat orders for YOU.

Don't let a loose bolt cause a dissatisfied customer. PAL-NUTS keep machinery in the same good condition in which it leaves the assembly floor.

Samples on request.

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FOSTER BOLTS AND NUTS CAPSCREWS

Personal Service *in Big Business*

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Telephone Broadway 840

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Daily shipment made country-wide. Gladly send customers references. Use best materials from largest mills. Confirmation on request. We cancel invoices without a quibble if you are dissatisfied with our merchandise

Fabricated Parts from Non-Ferrous Metals

Bolts, Nuts, Bushings, Springs, Ferrules, Coils, Nipples, Balls, Washers, Etc. — Made From — Brass, Bronze, Copper, Aluminum, Naval Brass, Monel Metal, Etc.

Catalogue on Request

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THE EVERITT CO.
281 Franklin St.
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WIRE NAILS

COATED TINNED GALVANIZED BLUED

MISCELLANEOUS NAILS
COTTER PINS

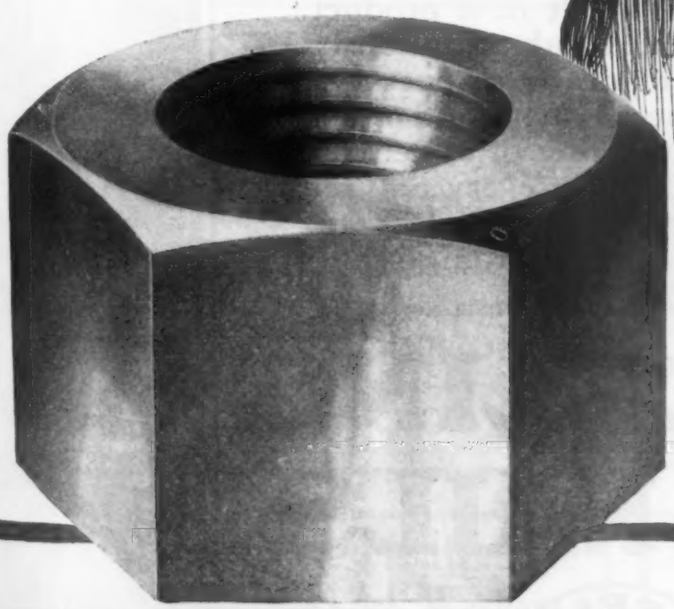
LOW CARBON BESSEMER AND BASIC WIRE

American Steel Company

Ellwood City, Pa.

Thread inspection is only one of the tests of these remarkable nuts.

They could serve you no better if they were made to order for the work you give them to do.



RUSSELL, BURDSALL & WARD
BOLT & NUT COMPANY
PORT CHESTER, N.Y.

Branch Offices: CHICAGO, DETROIT, ROCK FALLS, Ills., SEATTLE, SAN FRANCISCO

EMPIRE NUTS

Since 1852

There must be merit in a product which grows in demand continuously over a period of nearly seventy-five years. Truly there is merit and much of it in the entire line of Wheeling Cut Nails which meet every nail requirement on every type of job. Your jobber will supply you promptly.

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WHEELING CUT NAILS

WHEELING STEEL

RIVETS

Any kind and all sizes
for prompt shipment

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Telephone Congress 2628
or
30 Church St., New York
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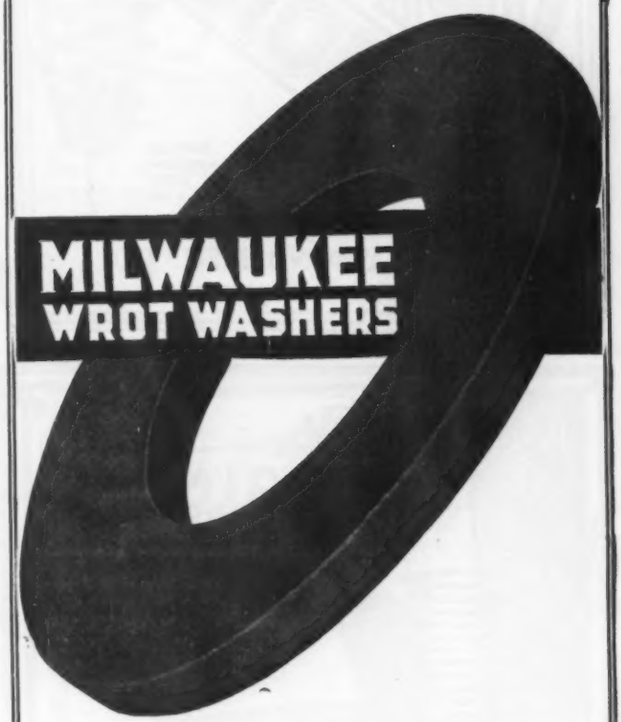
General Offices: New Brighton, Penna.

"The World's Largest Producers of Washers"



WROUGHT WASHER MFG. CO.
Established 1887
MILWAUKEE - - - WISCONSIN

NEVER SLIP

REG. U. S. PAT. OFF.
LOCK WASHER

This lock washer grips the nut 60% tighter than any other lock washer on the market.

Made in *all* sizes for every purpose.

Samples sent on Request.

LOCK WASHER DIVISION
National Umbrella Frame Co.
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You will find our service a source of great satisfaction in the prompt supply of washers and
Light Steel Stampings

Washers—
Standard and special shapes and sizes.
Any quantity

Joliet
Wrought Washer Company
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Genuine "Keystone" Positive Type Lock Washers

Put a Genuine "Keystone" Positive Type Lock Washer under any nut; give the nut a decent twist with a wrench, and nothing except another wrench will ever loosen it.
We also make Genuine "Keystone" plain type lock washers.

The Positive Lock Washer Co.
Newark, New Jersey
For Nearly 40 Years—Lock Washers Exclusively
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"It's in the Tempering"

A spring is as good as its temper. Whether in large or small quantities — Cuyahoga Springs are uniformly tempered to perform uniform service—GOOD.

The Cuyahoga Spring Company
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LEE-BUILT SPRINGS
FOR MACHINES AND OTHER SPECIAL REQUIREMENTS

All Types or Styles to Your Specification. Torsion, Compression, Extension and Flat.

Music Wire, Carbon & Chrome Vanadium Steel, Brass, Phosphor Bronze and Monel Metal

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Raymond Springs meet the requirements of the most critical. Can we serve you?

RAYMOND MFG. CO.
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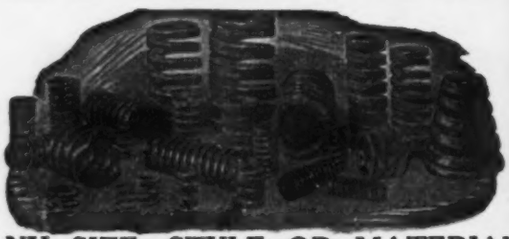
SPRINGS



ANY SIZE, STYLE OR MATERIAL
The Wm. D. Gibson Co.
QUALITY SPRING MAKERS
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SPRINGS AND SERVICE
We can give you both—any shape, material or type.
BARNES - GIBSON - RAYMOND, Inc.
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We have made Springs of all kinds for 3/4 of a century.
Experience Counts
The Dunbar Brothers Co.
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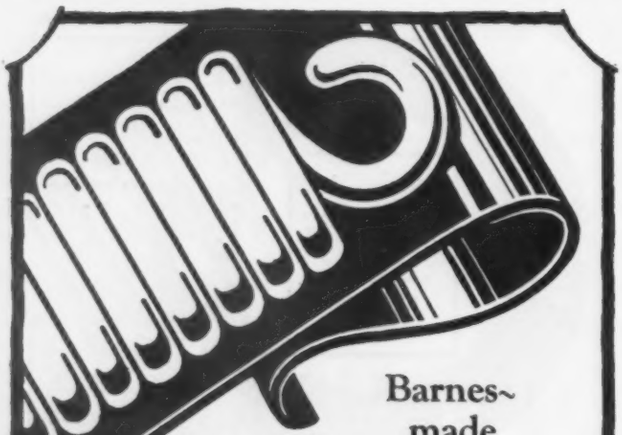

Barnes-made
Springs
Any Kind - Flat, Spiral or Torsion
Any Quantity - One to a Million
Any Material - Steel, Carbon or Alloy, Brass, PhosBronze, Etc.
DELIVERIES TO SUIT
Watch for our "Green Insert" NEXT WEEK
The WALLACE BARNES CO.
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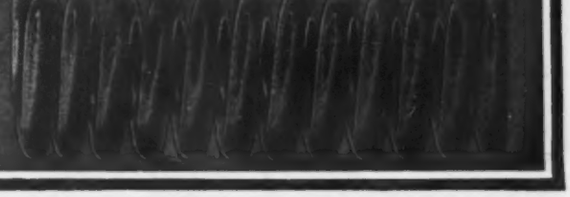

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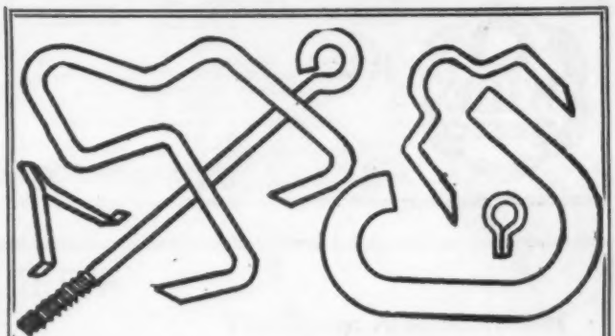

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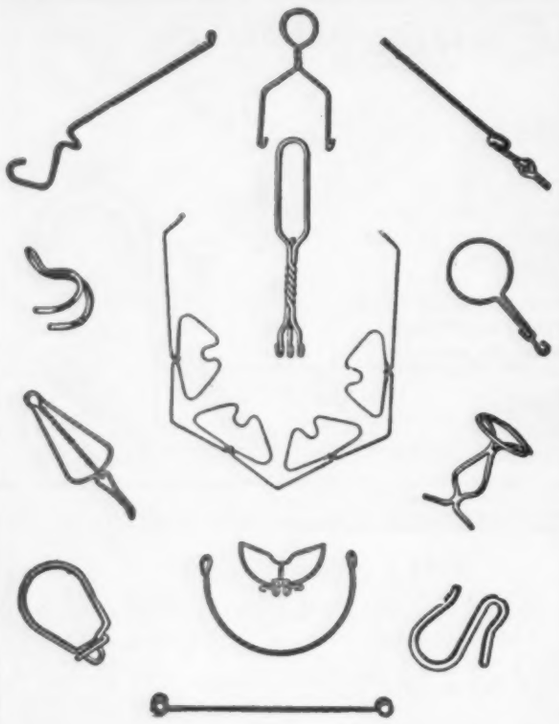

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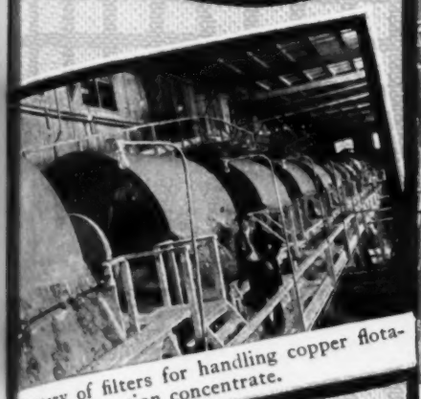
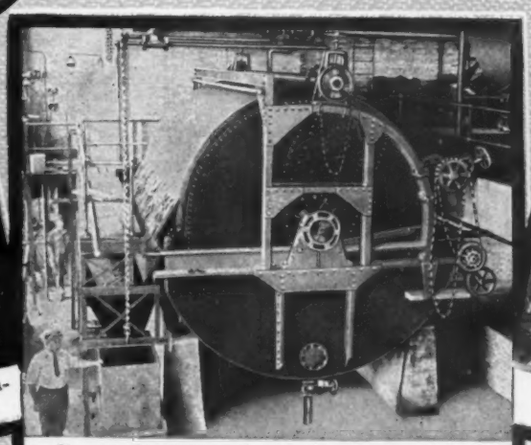
Efficient filtration and continuous economical operation combine in the Oliver filter, equipped with "Perfect" filter cloth and backing wires.

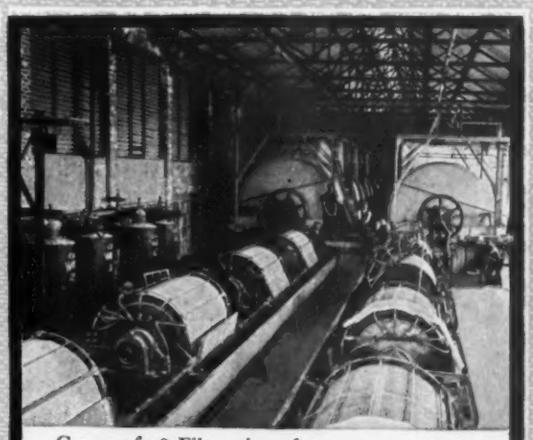


Battery of filters for handling copper flotation concentrate.



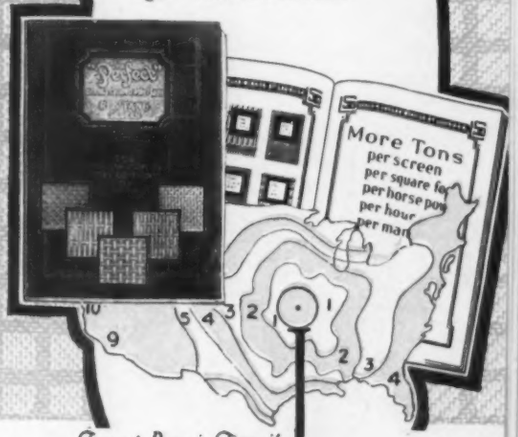
Dewatering Sewage Sludge by filtration in an ideal sanitary installation.

Seven filters in a noted gold producing property.



Group of 18 Filters in a famous sugar plant.

Screen users of all America depend upon the Ludlow-Saylor Screen Book for handy, reliable and intelligent Wire Cloth data.



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They screen more feed—they screen it cleaner—and they need less time, less power, to do it.

THEY screen more uniformly. Because "Perfect" screens are properly, accurately and honestly woven, the holes are permanently uniform in size and shape, and positively accurate.

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Light or heavy, tempered or annealed, rigid or flexible, pure metal or complex alloy, the wire in every Ludlow-Saylor Screen is the finest yet developed for its purpose—full gauge, full strength, full-value wires in warp and shoot. No false economies of cheapened weaving.

And "Perfect" weaving brings out the finest qualities of the metal. The fullest strength and vitality of the wire is preserved and reinforced in every crimp. No crystallized metal here—no strains nor broken surfaces — but maximum resistance to abrasion, vibration, corrosion, pressure, shock, with minimum hindrance to flow of feed or passage of fines.

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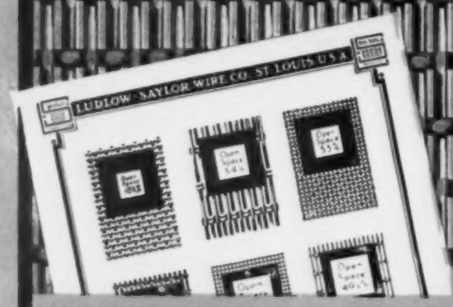
Send for Your Copy ~

of Screen Book No. 47-T4—The Text-Book on Screens. Free on request, of course—no obligation.

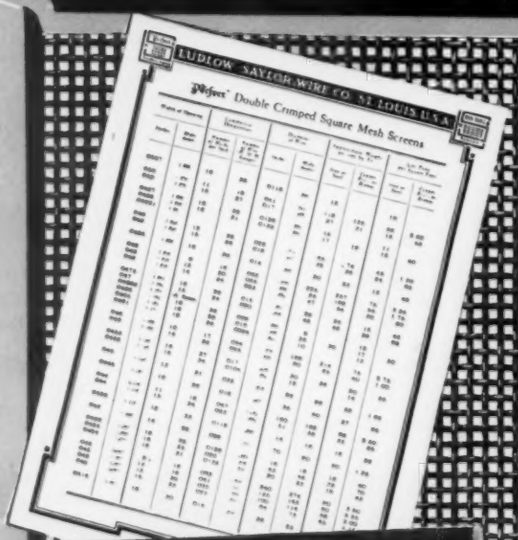


Ludlow-Saylor Wire Cloth

properly selected and applied to process equipments, saves power, time, attendance and replacement costs, improves the product and increases output.

The direct cost of Wire Cloth is a very minor item in the total of Operating Expense.

But choose the RIGHT SCREEN, and the same equipment will turn out cleaner, more uniform work, require less attendance and power, and *handle more tons* per machine, per square foot, per screen-cloth, per man, per hour and per dollar.



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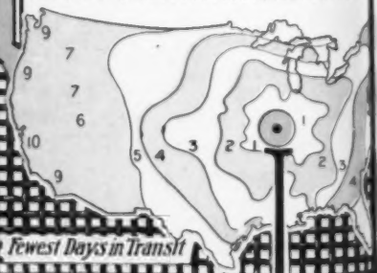

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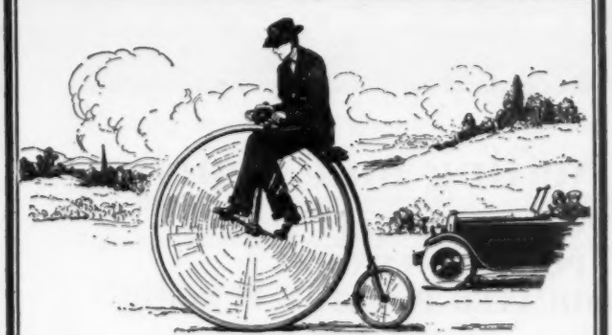

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Hercules Wire Rope can always be identified by its one red strand, which is also our guarantee that its exceptional quality is constantly maintained.

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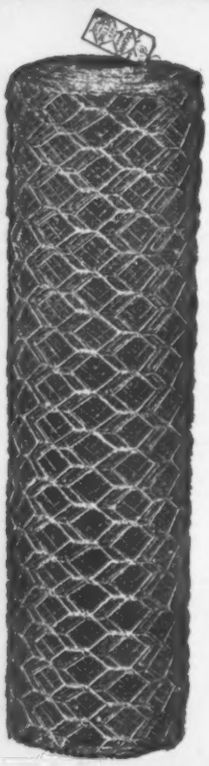

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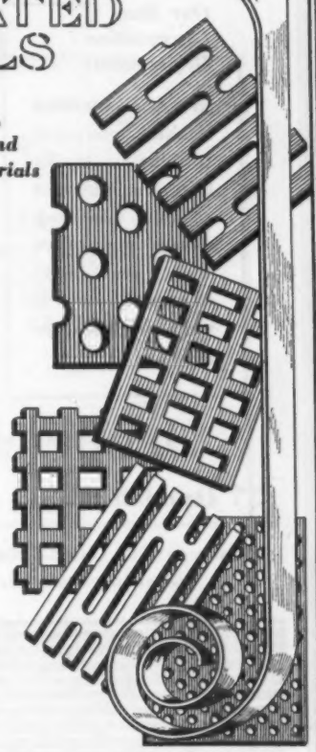

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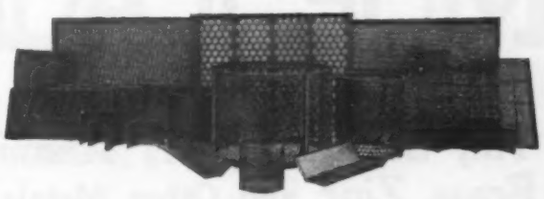

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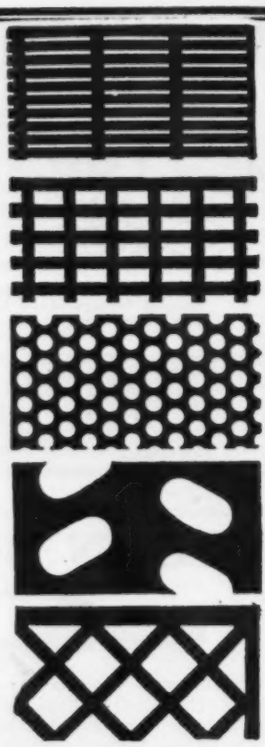

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make elevator buckets, conveyor troughs, stacks hoppers, elevator casings, loading chutes and other sheet and light structural iron work for all purposes.

We have made perforated metal screens for almost 40 years. Our success is due to broad experience, exceptional equipment and promptness to serve.

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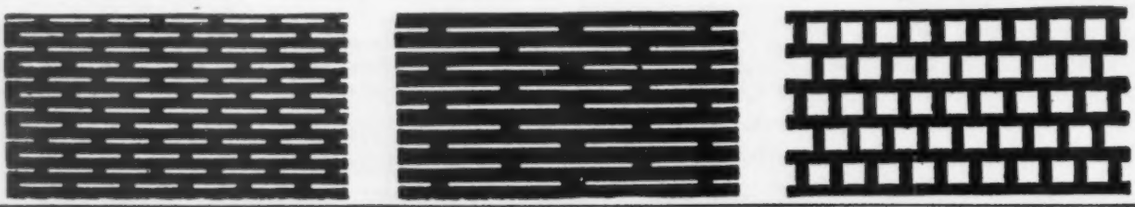

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Tin, Steel, Copper, Aluminum, Bronze, Brass, Zinc, and Other Metals and Materials

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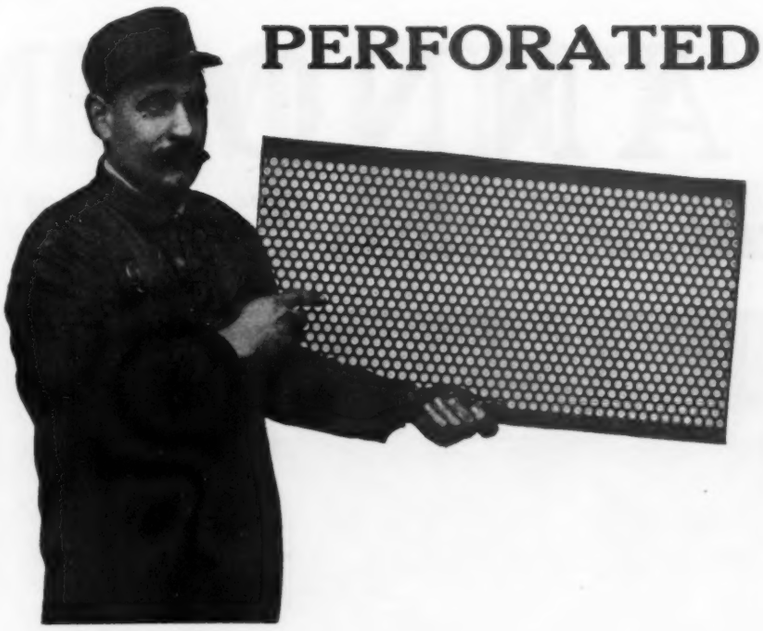

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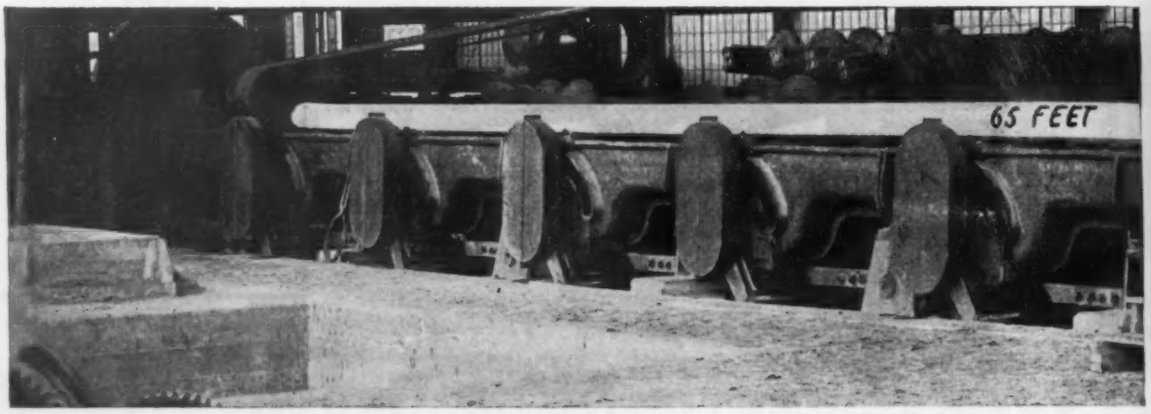
New Giant Seamless Tube Mill



Marvelous New Pilger Mill in One Continuous Operation Manufactures Cast Ingots Into Finished Seamless Steel Tubes Up to 12 In. Diameter and 50 Ft. Lengths

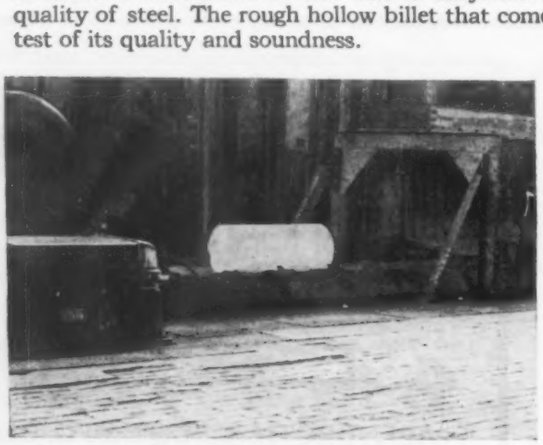
THE installation of this giant new Mannesman Pilger Mill was completed a few weeks ago, has been thoroughly tried out, and is now in full production. It was manufactured to our specifications and is housed in modern new buildings covering an area approximately 270 ft. x 800 ft. built expressly for it. Rarely is a complete mill unit completely designed and installed under such favorable conditions for quality and efficiency of production.

First Such Installation in America

It is the first seamless tube mill of its type and size to be installed and operated in an American plant. It is capable of turning out a tremendous tonnage of the finest quality seamless steel tubing in sizes ranging from six inches to 12 inches outside diameter, and in lengths up to fifty feet.

From Solid Ingot to Finished Tube

An extraordinary feature of this mill is that it successfully pierces a solid cast ingot, and in one continuous operation turns it out as a finished tube of large size. The ingots are all bottom cast, and the severe distortion to which a steel blank of this size is subjected in the piercing mill can be withstood only by the finest quality of steel. The rough hollow billet that comes from the piercing rolls therefore has passed a supreme test of its quality and soundness.



The round solid steel cast ingot leaving heating furnace for piercing mill

Pittsburgh Steel

Pittsburgh

NEW YORK
DETROIT
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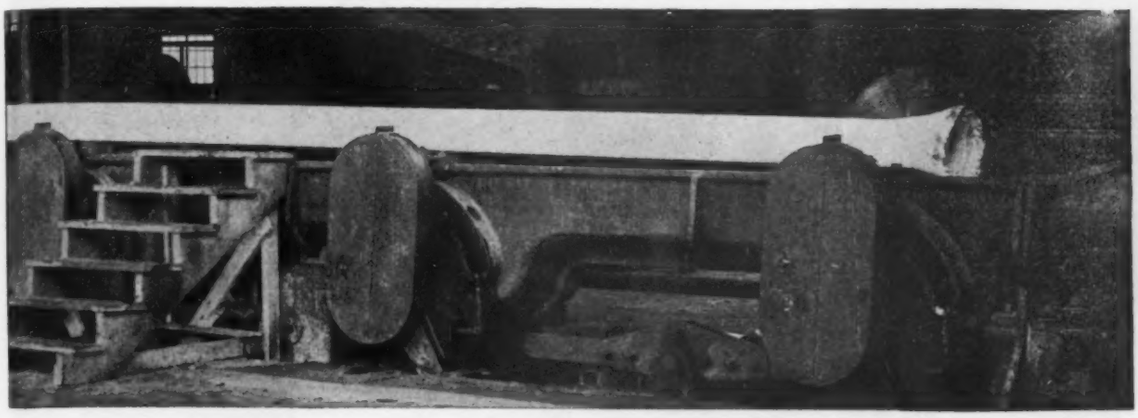
Is Now in Full Production



Pilgering, a Forging Process

IN pilgering, the unfinished part of the hollow billet is repeatedly forced between the eccentric pilger rolls which seize, compress, and force the billet back. At operating speed this becomes hammer-blow action on the steel, the same as a forging hammer. The thick walled hollow billet about 8 feet long is thus pilgered (forged) into a tube of the desired wall thickness and in some cases, as in the above illustration, 65 feet long (before the ends are cropped).

Thus the superior quality steel which has passed its first test in the piercing operation is converted into a tube of the excellent texture that is a characteristic of pilgered steel. The pilgered tube now passes to a hot saw, the crop ends taken off, then to the sizing mill, cross rolls, and various cut-off and threading machines for the finishing operations. For certain finishes the pilgered tube is reheated and passes through a reeling machine before reaching the sizing mill.

A Boon to Oil Country Operators

These superior quality seamless steel tubes in large sizes and lengths for casing, drill pipe, etc., with their greater strength and elastic limit prove of wonderful advantage in oil country activities. Manufacturers in other industries also, are placing orders for material from this new mill. We have, of course, other seamless steel tube mills and manufacture boiler tubes, arch tubes, superheater flues, and tubing for automobile and other mechanical purposes. Your inquiries will be appreciated and our engineers will gladly give study to the possible application of "seamless" to your problems.

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The rough hollow billet emerging from the piercing mill

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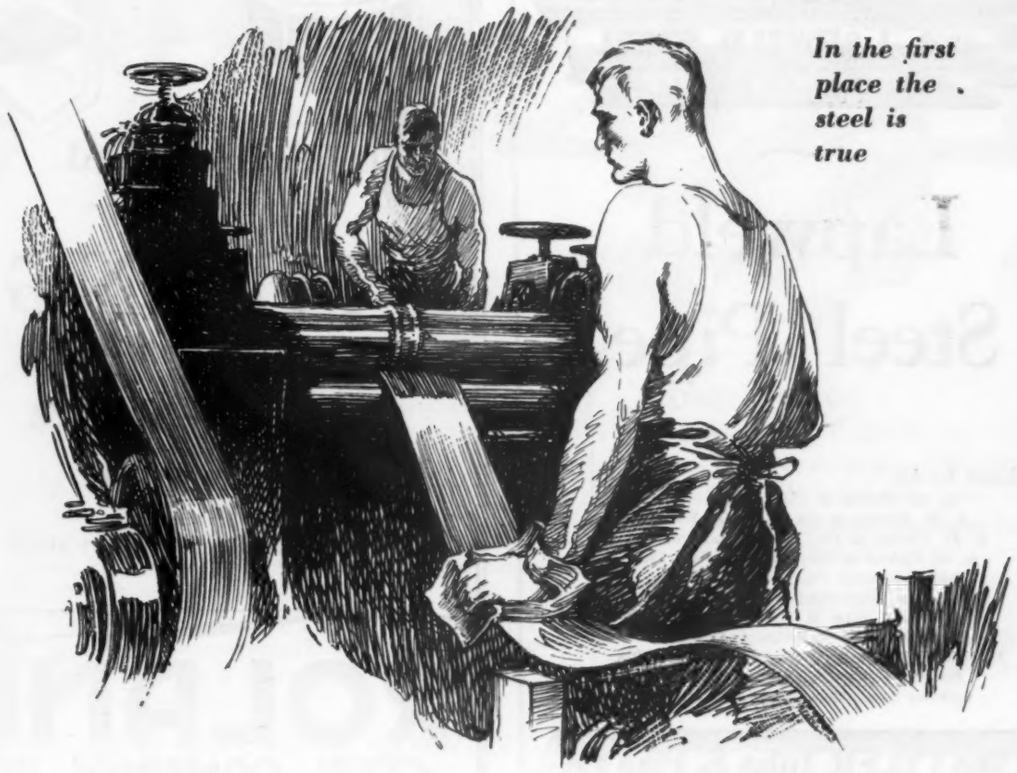

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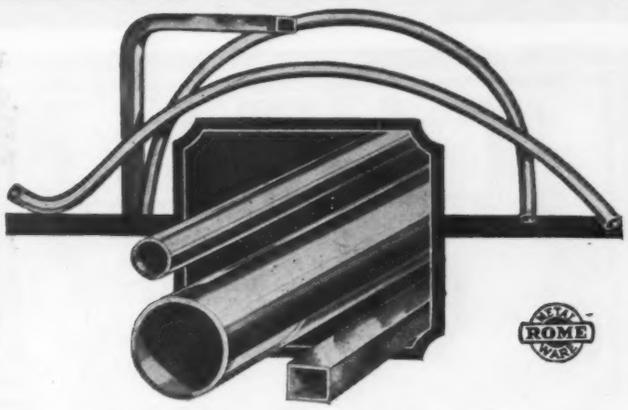

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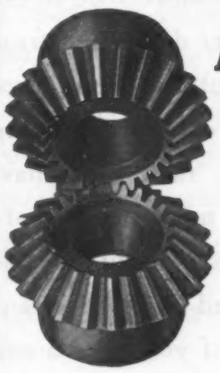

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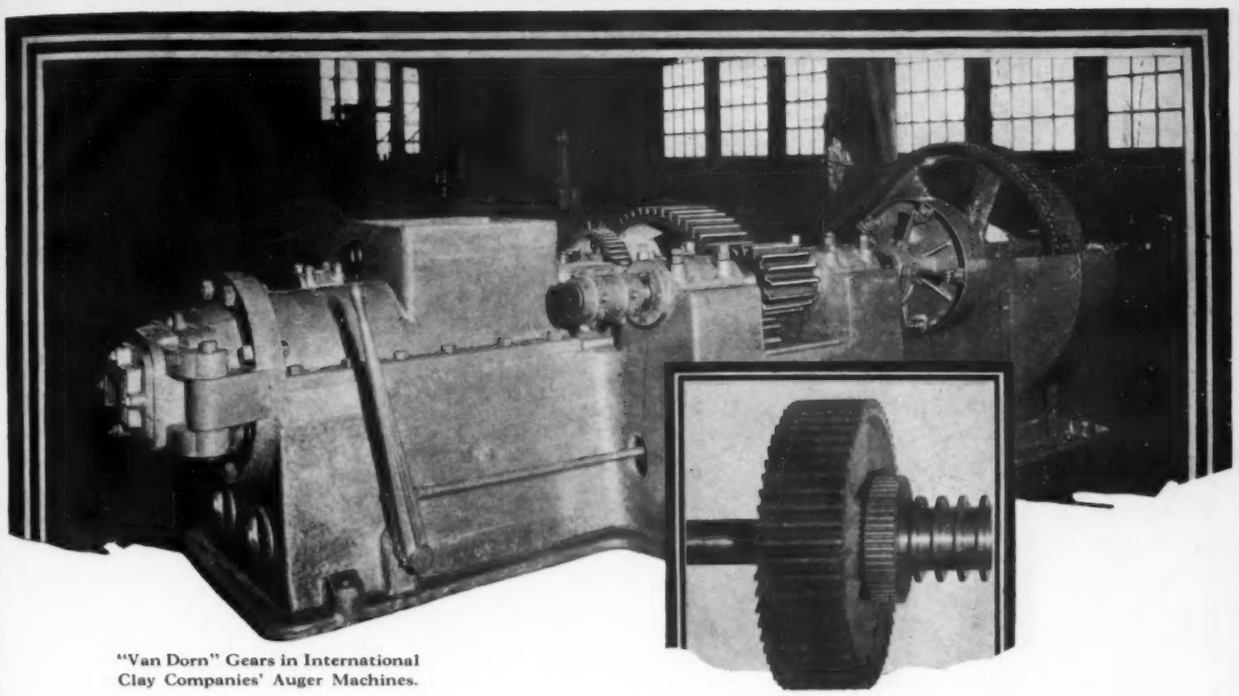

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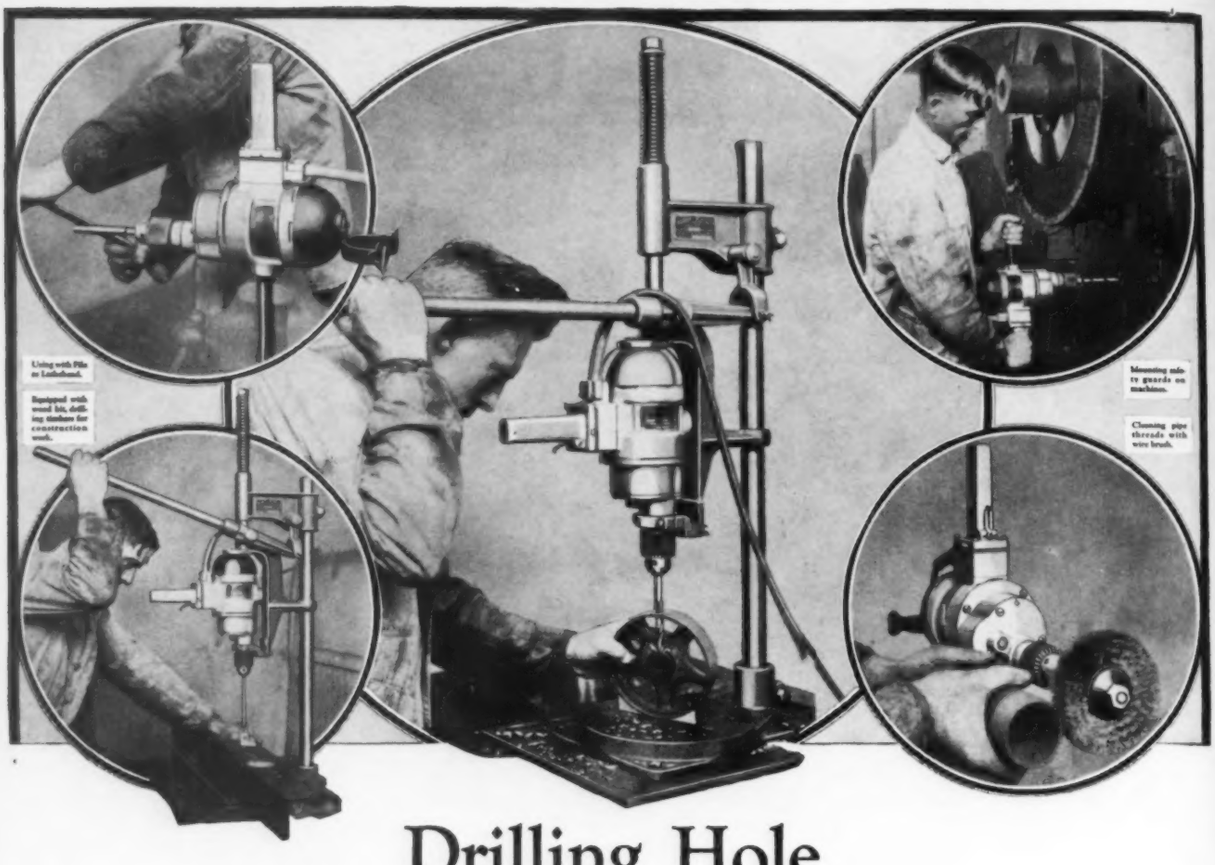
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Equipped with wood bit, drilling timbers for construction work.
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Using with File as Lathehead.
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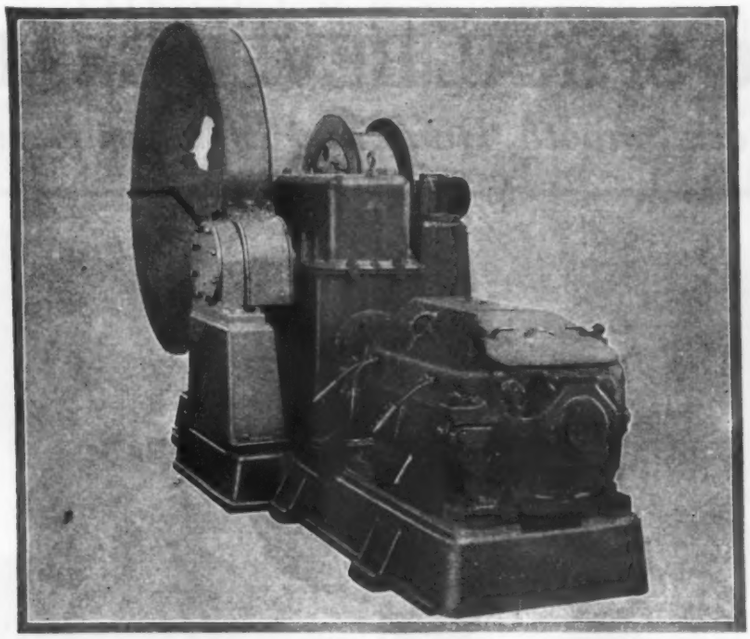

Casting wheel drive at the Union Miniere du Haut Katanga, Belgian Congo, Africa. The standard Cleveland Worm Gear Reduction Unit transmits the power of a 30 hp. motor at 625 r.p.m. with a reduction ratio of 29½ to 1.

In Africa They Use Standard Clevelands

The installation pictured is an excellent illustration of the coordination of standard equipment for a special drive. The available space was extremely restricted; the position and direction of rotation were fixed; and the power is finally delivered at very slow speeds. The Cleveland organization designed and built the complete drive.

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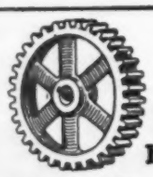

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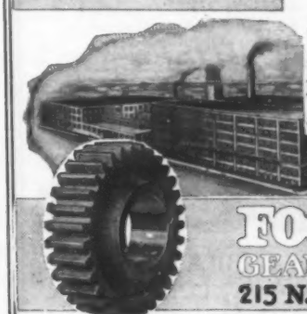

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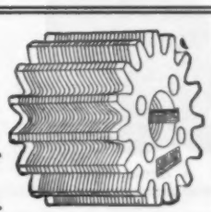

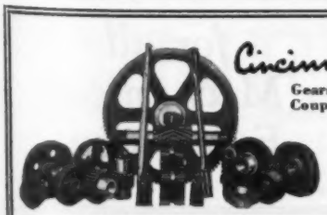

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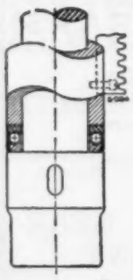

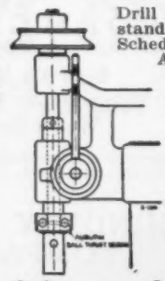

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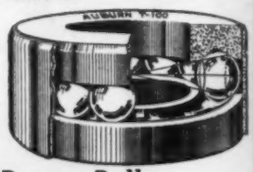

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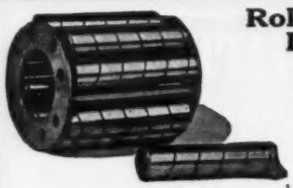

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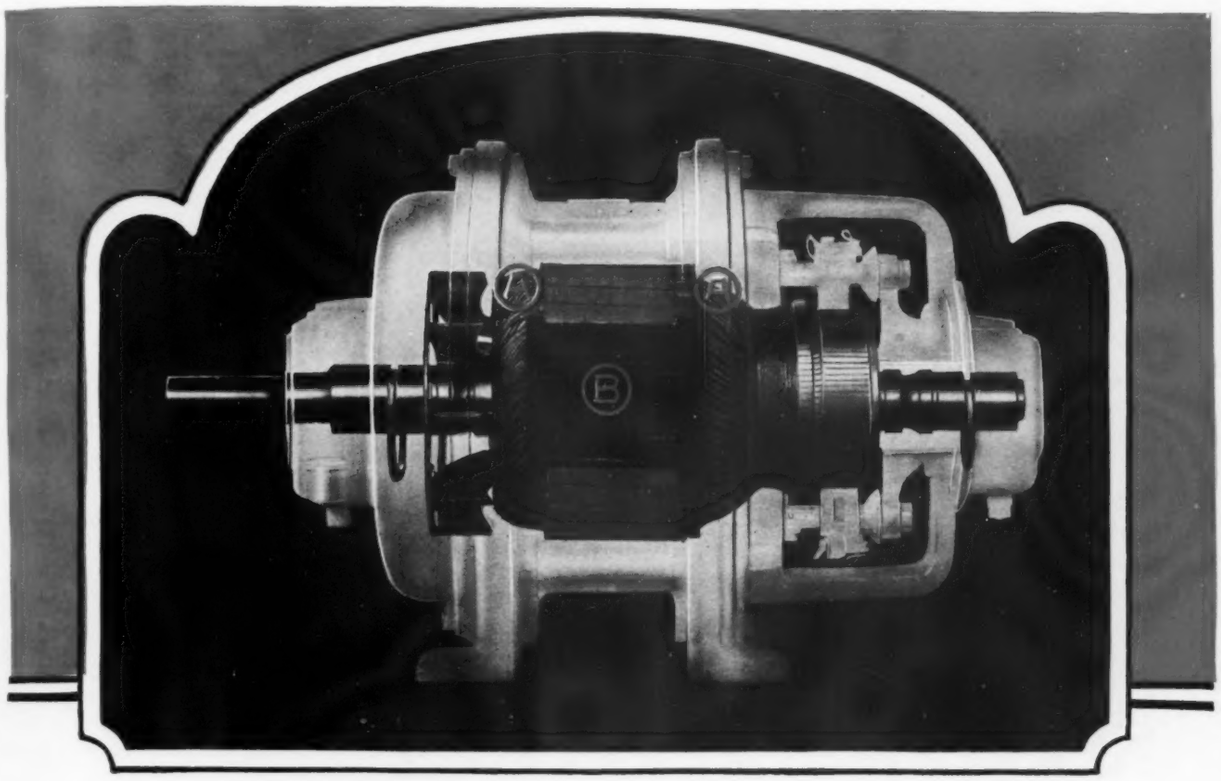

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Exceptionally satisfactory starting, accelerating, and running characteristics of the Type SCR single-phase motor are largely secured through the use of the double wound armature (shown in "phantom").

"A"—External or primary rotor winding gives to Type SCR the *high starting torque* of the series repulsion motor.

"B"—Internal or "Squirrel cage" armature winding gives to Type SCR the *constant speed* characteristics of the straight induction motor—as the SCR comes up to speed this winding becomes more and more effective until at full speed the load divides between repulsion winding ("A") and squirrel cage winding ("B").

The SCR operates without mechanical short circuiting switches or centrifugal devices.

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204-1

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The ARISTOCRAT of MAGNETIC SWITCHES

THE famous General Electric Motor Starter—CR7006—is truly the aristocrat of magnetic switches. It is an aristocrat because it represents the finest development in these switches; because it is so built that the G-E monogram on its cover may continually identify it as sterling.

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- The amount of copper in the fingers and shunts
- The heavy spring pressure on each finger
- The powerful magnet which closes the fingers against this pressure
- Its exceptional temperature overload protection
- Its unusual accessibility and ease of installation
- The respect in which it is held by all familiar with it

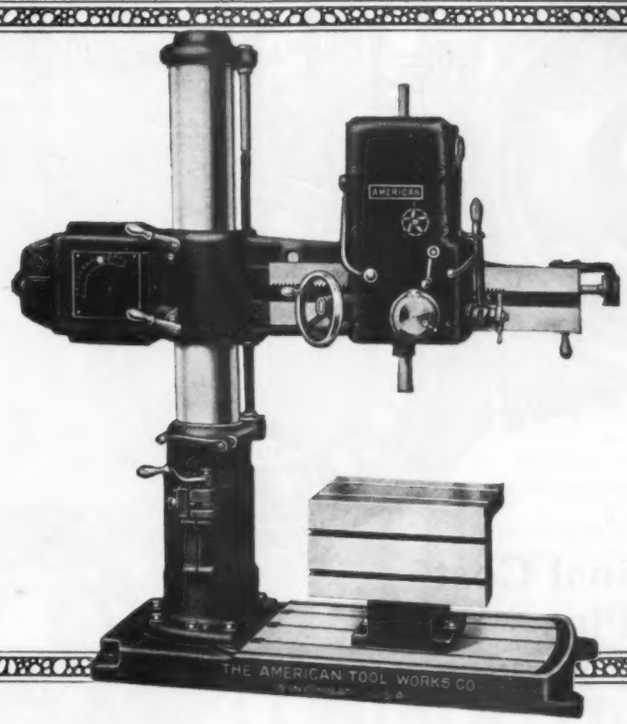
While you were reading this, another CR7006 was installed. Write to your nearest G-E office for complete information.

General Electric builds control of exceptional design, construction, and performance for every motor application. Write for the industrial control catalog GEA-257. It contains the complete story together with much valuable information on correct control applications.

301-7

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY N. Y., SALES OFFICES IN PRINCIPAL CITIES



New Departures Answer the Demand for Speed, Accuracy and Endurance in Production Machinery

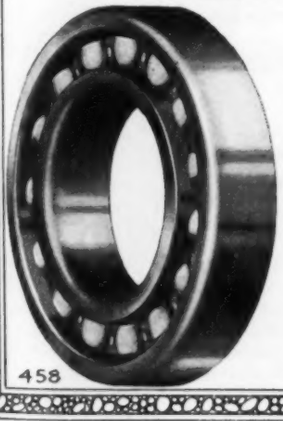
THIS Maxi-Speed sensitive radial drill is a good example of the modern machine that is making automotive production what it is today. The individual drive is by ball-bearing-electric motor and the drive shafts are also equipped with New Departure Ball Bearings.

The ball bearing motors pay a 20% dividend—in terms of reduced maintenance, and add materially to their long life, while in the support of shafts New Departures reduce friction and wear, maintaining rigid and proper alignment of shafts and adjustment of gears.

The New Departure Engineering Handbook gives the detailed mountings of New Departures in over 170 types of machines. This book and the supplements mailed monthly are offered to engineers, production managers and master mechanics without obligation.

THIS sensitive radial drill, because of its extremely high speeds, ease of operation and flexibility is extensively used in drilling, tapping and counterboring chasses, transmission cases, engine frames and automotive accessories.

The choice of New Departure Ball Bearings for this high grade machine has been fully justified by experience. As stated by the American Tool Works, "Every bearing is equipped with the highest quality dust-proof ball bearing, consequently power loss through transmission is negligible."



THE NEW DEPARTURE MANUFACTURING COMPANY
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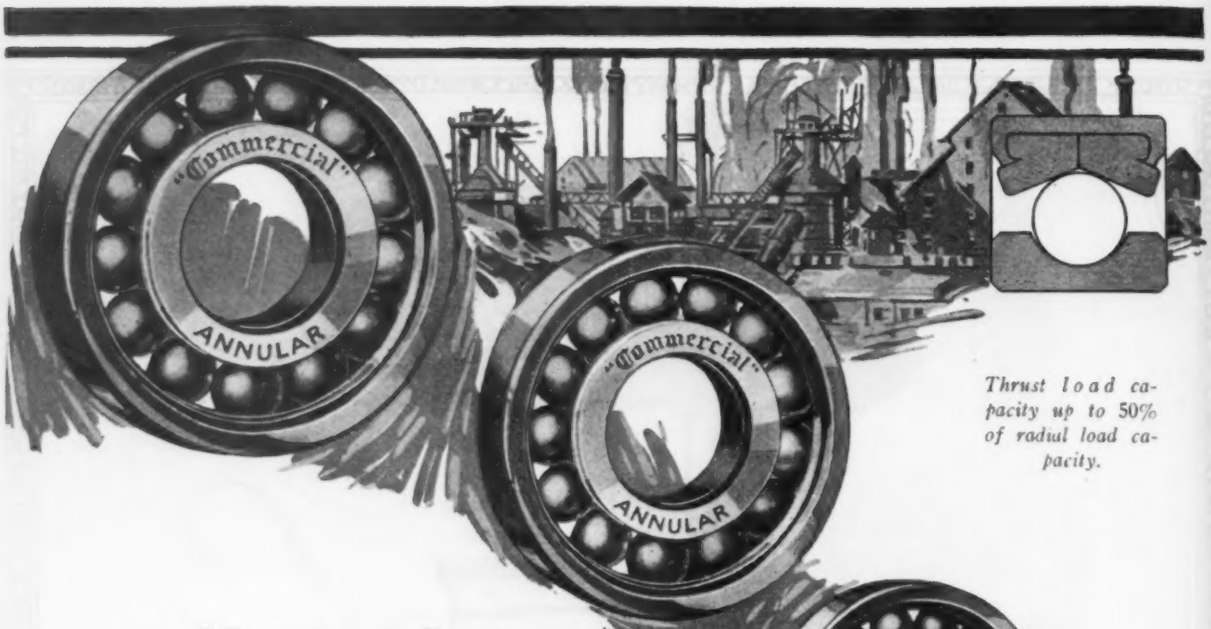
New Departure Quality Ball Bearings



Thrust load capacity up to 50% of radial load capacity.

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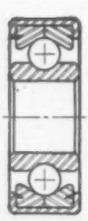

A TYPICAL INSTALLATION

Sign flashers usually consist of a main shaft on which there are spring copper segments forming parts of switches, this main shaft being connected by worm and worm gear to a shaft direct connected to an electric motor. "Commercial" Annular Ball Bearings are used on both the main shaft and the worm shaft. On main shaft, Type A bearing No. 1110. On worm shaft, Type A bearing 2080.

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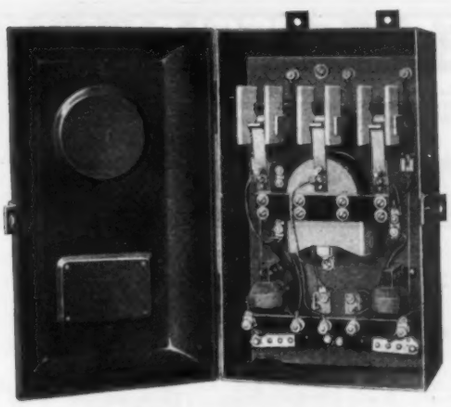

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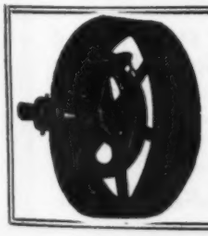

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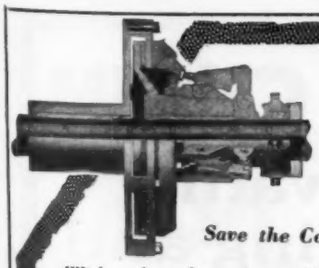

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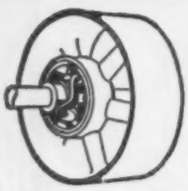

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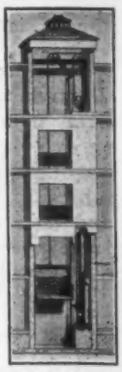

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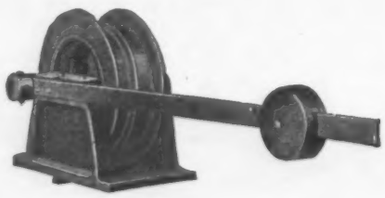

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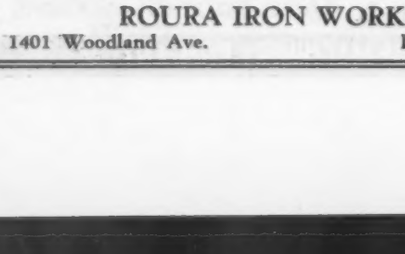

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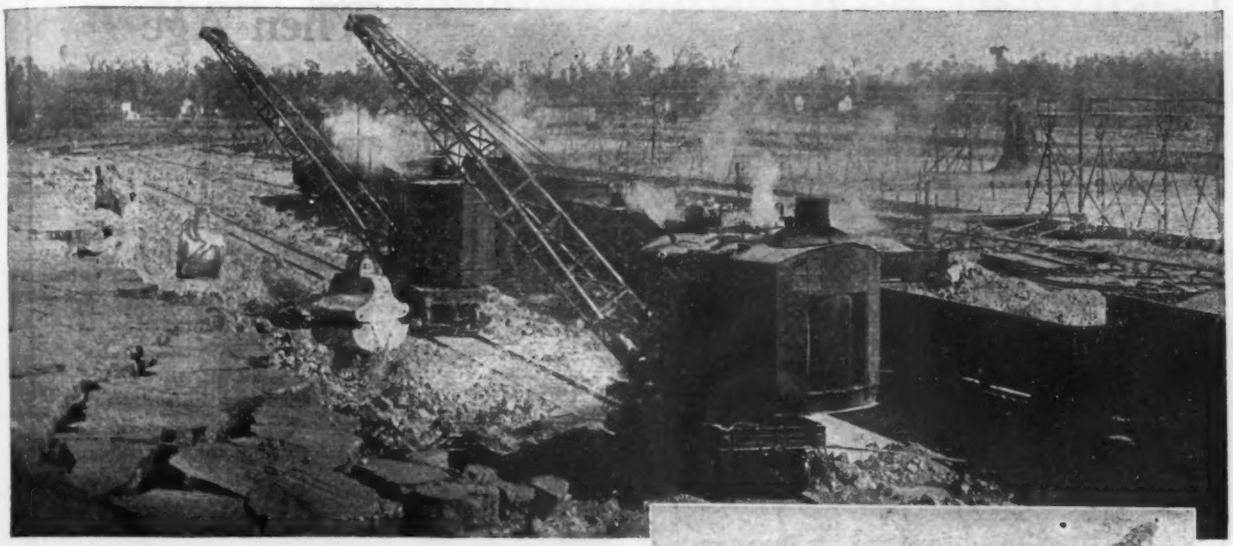
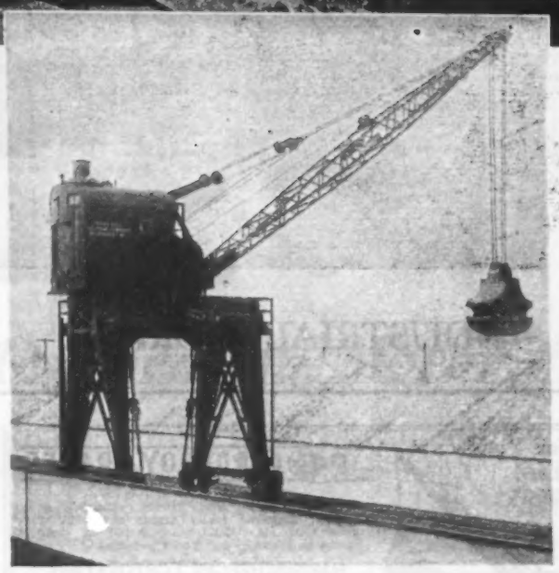


900 Tons of Sulphur handled hourly

Down along the Gulf at Pier 35, Brownhoist Crane No. 9254—the ninth purchased by a large southern sulphur company—is working night and day to keep abreast with the tremendously increased demand for sulphur.

On the same pier two similar Brownhoists, both five years old, have been handling 600 tons of sulphur an hour and working 22 to 24 hours a day. Crane 9254 increases this dock's capacity to 900 tons hourly or can be used as an auxiliary to the two cranes.

This company's Brownhoists, the oldest of which has been in use over 7 years, range from 10 to 40 tons capacity. All are used for sulphur handling but they would be equally speedy and dependable for handling coal, sand, stone, etc., with bucket, or on hook block or magnet work.



The three Brownhoists at Pier 35 are the same type and size as the crane pictured above in the smaller illustration. They have a capacity of 40 tons and are equipped with 84-cu. ft. Brownhoist link-type buckets.

The top illustration shows two No. 4 Brownhoists of 20 tons capacity handling sulphur with 54-cu. ft. Brownhoist link-type buckets.

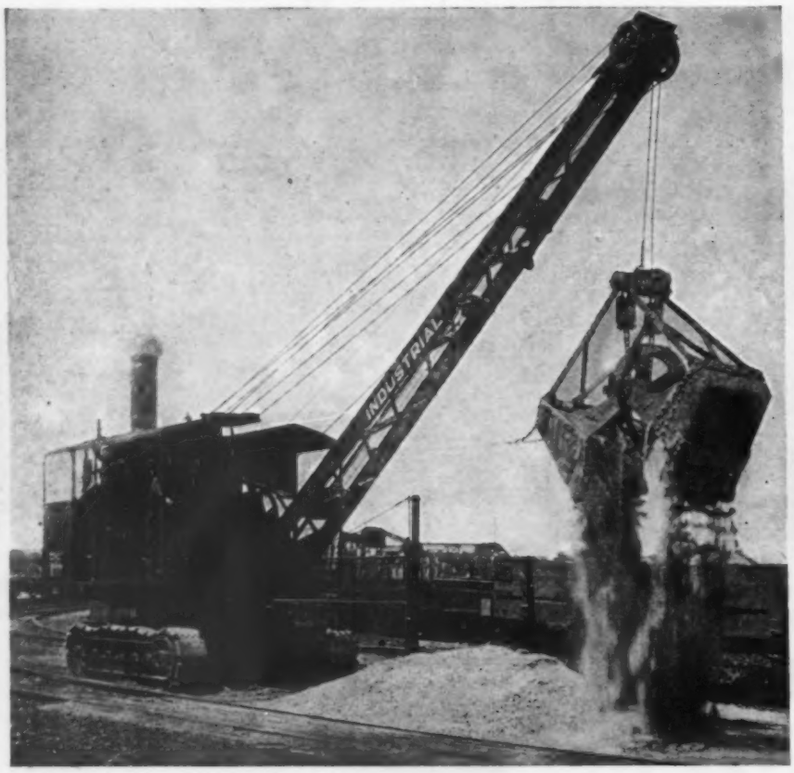
Tell us the kind of work you do and we'll be glad to send you information on the right size and type of crane for your job.

The Brown Hoisting Machinery Company, *Cleveland, Ohio*

Branch Offices: New York, Chicago, Pittsburgh, New Orleans and San Francisco

BROWNHOIST

GOOD MATERIAL HANDLING MACHINERY



When Age Creeps in—

THERE comes a time in the life of every machine when some part must be removed for repair or replacement, and when that time comes you will want to be able to get at that certain part easily. Then it is that real accessibility is appreciated.

The design of the INDUSTRIAL crawler machine is such that parts may easily be removed without taking out several gears and shafts before the desired part is reached. You can replace or repair parts without disturbing the rest of the machinery. That is real accessibility—another excelling feature of the INDUSTRIAL crawling tractor crane, shovel and dragline.

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P&H CORDUROY CRANES

Equipped with hook, bucket, clamshell or magnet, they can easily handle any kind of loose materials. Easily maneuvered on their Corduroy traction—no tracks required.

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Efficiency THE ARMINGTON ENGINEERING CO. Economy
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A Boat Builder obtained immediate stock delivery from us of an Electric Hoist for urgent need in his Yard.
(See Page 191)

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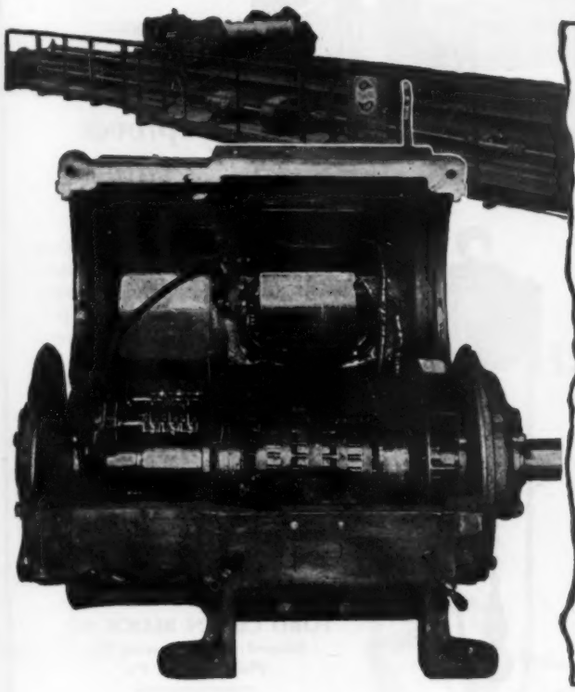

The satisfactory results obtained have proved that inspection labor can be cut down materially in addition to the savings resulting from the following items:

(1) Reduced number of rewinds caused by oil-soaked armatures.

(2) Reduced lubricating expense.

(3) Reduced repair and shop labor on bearing renewals.

(4) Less oil and grease on rolled products.

(5) Less power consumption.

(6) Reduced inventory of spare commutators and coils.

After calculating the above savings, it was determined that a substantial return exists on the investment cost required to equip all new motors with roller bearings. This added investment cost is approximately ten per cent extra per motor. Accordingly, practically all new motors have been purchased with roller bearings.

READ THIS EXCERPT

from an article by A. G. Place, E.E., Youngstown Sheet & Tube Co., entitled "Anti-Friction Bearings on Steel Mill Motors," appearing in the Industrial Engineer, June, 1926.

Timken Tapered Roller Bearing Motors!

The excerpt above, from an article "Anti-Friction Bearings on Steel Mill Motors," by A. G. Place, E.E., points out the important advantages of roller bearing equipped motors on traveling cranes in steel mill service. Milwaukee Cranes are equipped with Crane Motors in which Timken Tapered Roller Bearings, mounted in dust proof housing and lubricated with grease, are incorporated. In addition to reducing frictional losses, roller bearings eliminate trouble caused by oil soaked commutators, greatly increase the life of bearings, maintain a constant air gap, and require very little attention.

Roller bearing motors is another outstanding feature of Milwaukee Cranes in addition to the salient and exclusive Milwaukee feature of positive oil lubrication, with fully enclosed gearing and bearings, sealed against destructive grit and dirt.

The long service life and low maintenance costs of Milwaukee Cranes is due to modern features such as these.

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Our new catalog completely describes and vividly pictures Milwaukee Traveling Cranes and Hoists. It gives you detailed information on its exclusive feature—positive oil lubrication. Send for it today.

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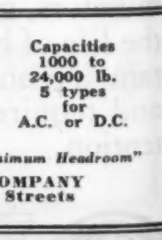

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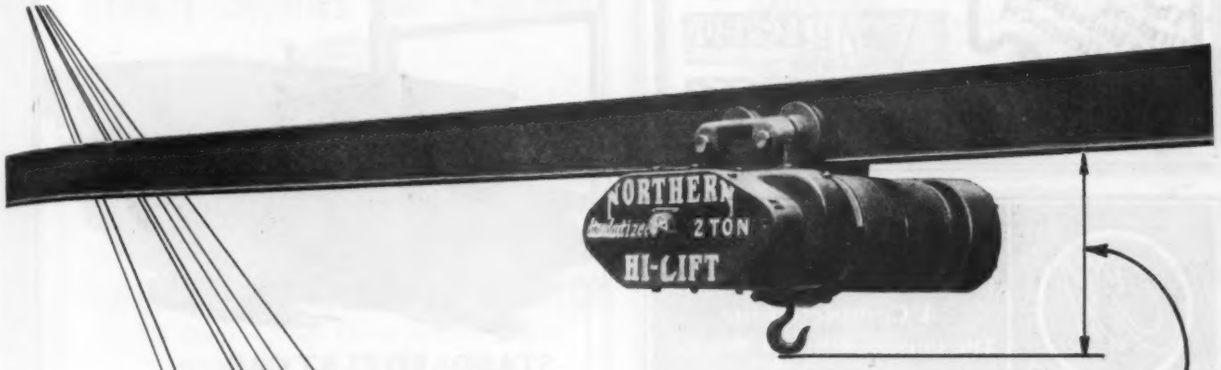

HEAD ROOM!

Inches Saved Here Mean "Miles" Saved Here

Simplicity of Construction

The simple construction of the "Hi-Lift" hoist makes maintenance costs trivial, while its extra features (note them below) further enhance the qualities that make it the electric hoist of the age.

Gearing of transmission type entirely contained and enclosed in a rigid cast frame.

Top and bottom automatic limit and tops.

Two distinct brakes insure adequate braking and control of the load.

Machine grooved hoisting drum and rope sheaves exceptionally large diameter.

Guarded ball bearing lock block—Timken Roller Bearings throughout—All working parts enclosed—Forged Steel Hook.

Every inch of head room saved and every inch of hook lift possible represents "feet" and "yards" and "miles" of expenditure saved.

Stop paying toll to head room!

The Northern "Hi-Lift Electric Hoist" has developed with this expense elimination in mind.

Note how close to the I Beam the hoist travels—also the closeness of the hook to the hoist when raised.

Truly this hoist is filling a long felt want where efficiency, limited clearance and high lift are demanded.

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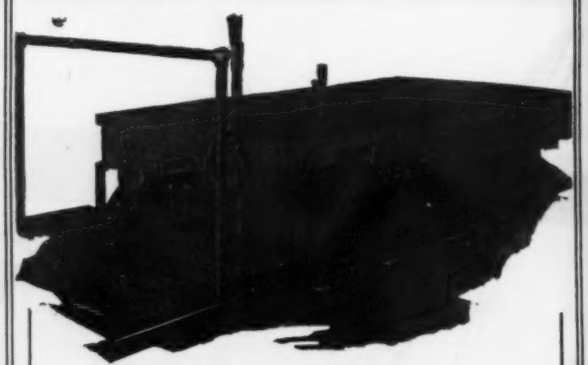

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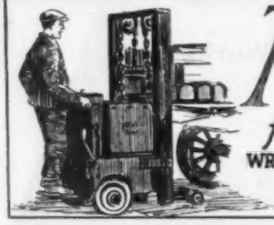

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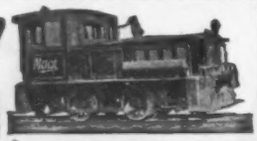

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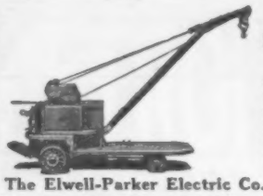

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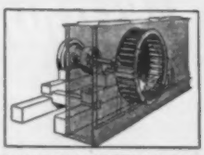

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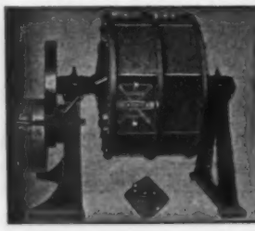

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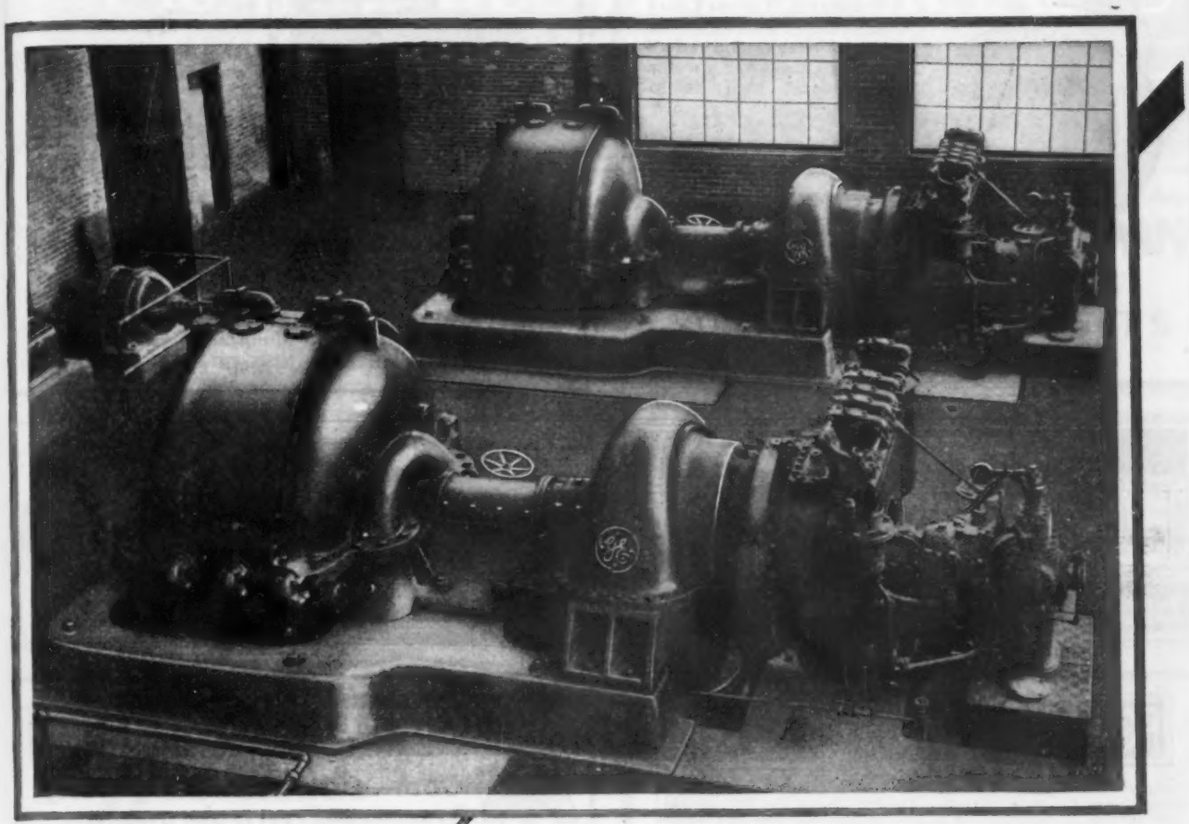

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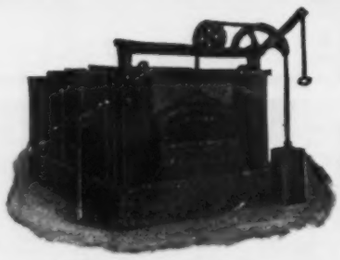

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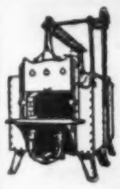

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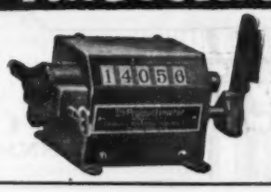

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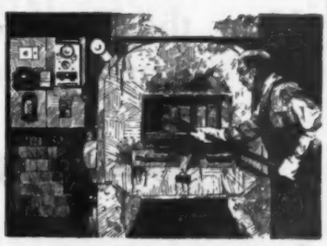

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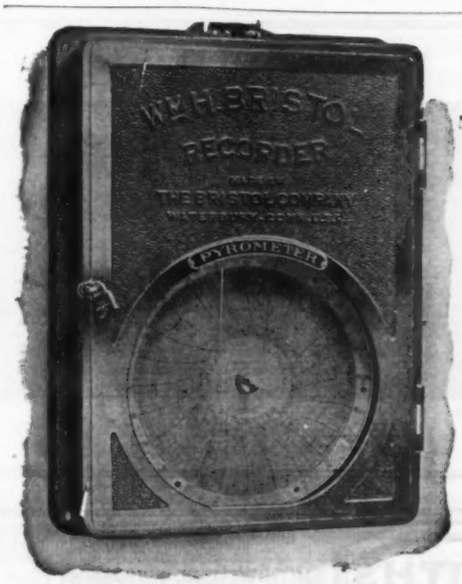

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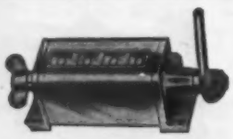

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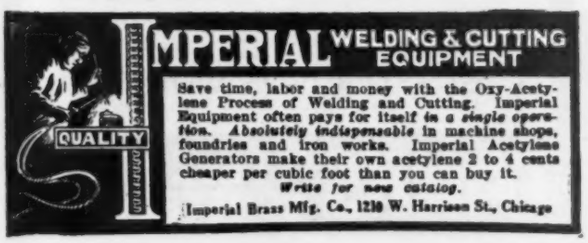
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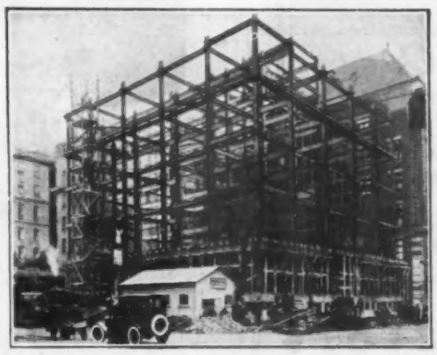

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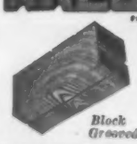

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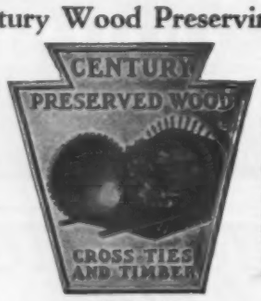


Trademark

Zinc Treatment

Industrial plants and railroads should use treated material for tracks and wood structures. This will reduce maintenance charges.

Operating Plants: Pittsburgh Wood Preserving Co., Adelaide, Pa. Ohio Wood Preserving Co., Orrville, Ohio. Michigan Wood Preserving Co., Reed City, Mich. New England Wood Preserving Co., Nashau, N. H.

Offices: 1053 Century Building, 132 Seventh Street, Pittsburgh, Pa. 618 Chamber-Commerce Bldg., Boston, Mass.

Miss Classified

makes it easy for you to use these sections. If you want to buy, sell, hire, make, invest, you can

profit by using

THE CLASSIFIED SECTIONS
of The Iron Age

OPEN STEEL IRVING FLOORING

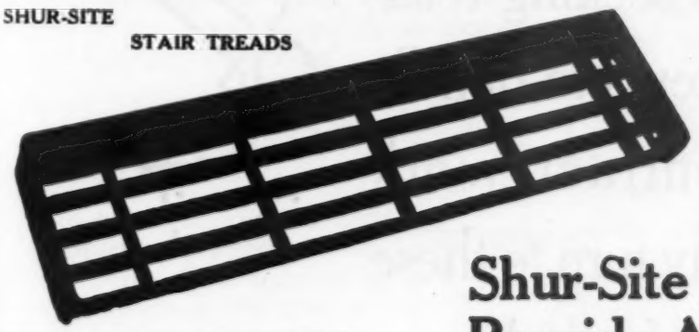
TRADE MARK SUBWAY REGISTERED

There's ideal "tractive resistance" in this all-steel safety flooring—a non-slipping surface for the men—a smooth surface for truck wheels—a wheel-gripping surface for tractors. And there's the strength and permanence of steel, with the convenience of panel construction.

Have you Bulletin H-7?

IRVING IRON WORKS CO.
LONG ISLAND CITY, N.Y. U.S.A.
Established 1902

SHUR-SITE
STAIR TREADS



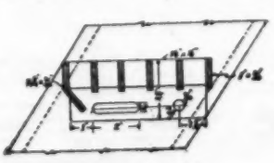
MITCO
Rivetless Construction

Shur-Site Stair Treads Provide Absolute Safety

In the left hand panel you will see one of the safety points of "Mitco" Shur-Site Stair Treads. The others are in the "Mitco" construction.

"Shur-Site" Stair Treads are rigidly built of interlocked steel bars pressed together under 300 tons pressure. There is no chance of them working loose, no chance of them clogging or forming a slippery surface.

For safety, use "Mitco" Products. Write for a circular.

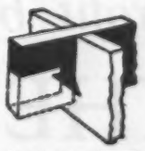


Nosing Bar bent to angle of 45 degrees defines front edge of tread and at same time is self-clearing. Avoids misstep.

Joint Prepared

HENDRICK MFG. CO.

42 Dundaff Street, Carbondale, Pa.
New York Office: 15 John St. Phone Cortland 2440
Makers of Hendrick Perforated Metal Screens
Pittsburgh Office: 904 Union Trust Bldg., Pittsburgh Pa.

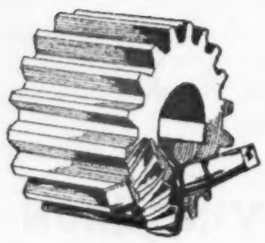


Lock completed under 300 tons pressure

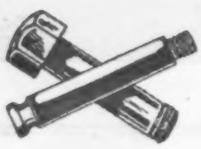
What Do You Do?

Stamping
?

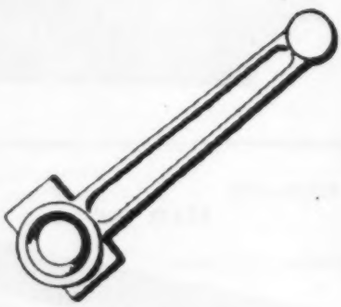
You know that money is earned only when the wheels are turning. Keep them turning by advertising in the Contract Work Section of The Iron Age. Manufacturers seeking reliable concerns to handle their contract work constantly turn to these pages for help.



Gears
?



Screw Machine Work
?



Forging
?

Galvanizing
?

Your story goes home at small cost.

Machine Work
?

Profit by using

THE CLASSIFIED SECTIONS

of the Iron Age

Where rail, water and highway meet

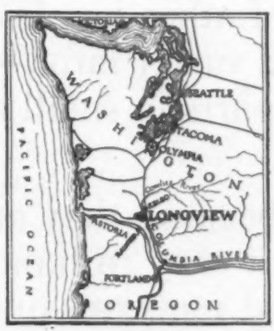
LONGVIEW, Washington

The Logical Location for Machinery Manufacturers

WHEN the Weyerhaeuser Timber Company's mills at Longview are completed, their output and that of the vast lumber plants of The Long-Bell Lumber Company will give Longview a lumber production as large as that of any single point in the world. This new industrial city is in the heart of the great Pacific Northwest timber area, with varied transportation facilities to reach the hundreds of lumber and logging operations.

Here then is a logical location for machinery manufacturers who produce logging and lumbering machinery. A local plant would be in a position to give quick service in both complete machines and repair parts. Fast service on repair parts is essential and is good paying business.

Raw materials, such as pig iron, coke, sand, scrap, bars and shapes can be landed at Longview at low freight rates by ocean freighters by reason of the city's deep-water transportation facilities.



Basic industries of the Pacific Northwest, which are heavy users of machinery include: logging, sawmilling, woodworking, textiles, flour milling, canning and pulp and paper manufacturing.

Longview is strategically located on the deep Columbia River with its ocean-going commerce, halfway between Portland and the Pacific Ocean—the ocean but 50 miles away; served by rail, by the Northern Pacific, Union Pacific, Great Northern and Longview, Portland & Northern. Ample Columbia River docks accommodate largest ocean freighters. The paved Columbia River and Pacific Highways both serve Longview and a third, under construction, will open a fertile region to the west.

Longview offers an assured supply of dependable power at reasonable rates; expanding and accessible markets, domestic and foreign; ideal living conditions; temperate climate conducive to maximum labor efficiency, cheap fuel.

Here is genuine opportunity for machinery manufacturers.
Send the coupon below for complete data on Longview.

THE LONGVIEW COMPANY, LONGVIEW, WASHINGTON

THE LONGVIEW COMPANY, 220 Mt. Hood Bldg., Longview, Wash.
Gentlemen: Please send me additional data concerning Longview as a location for _____

_____

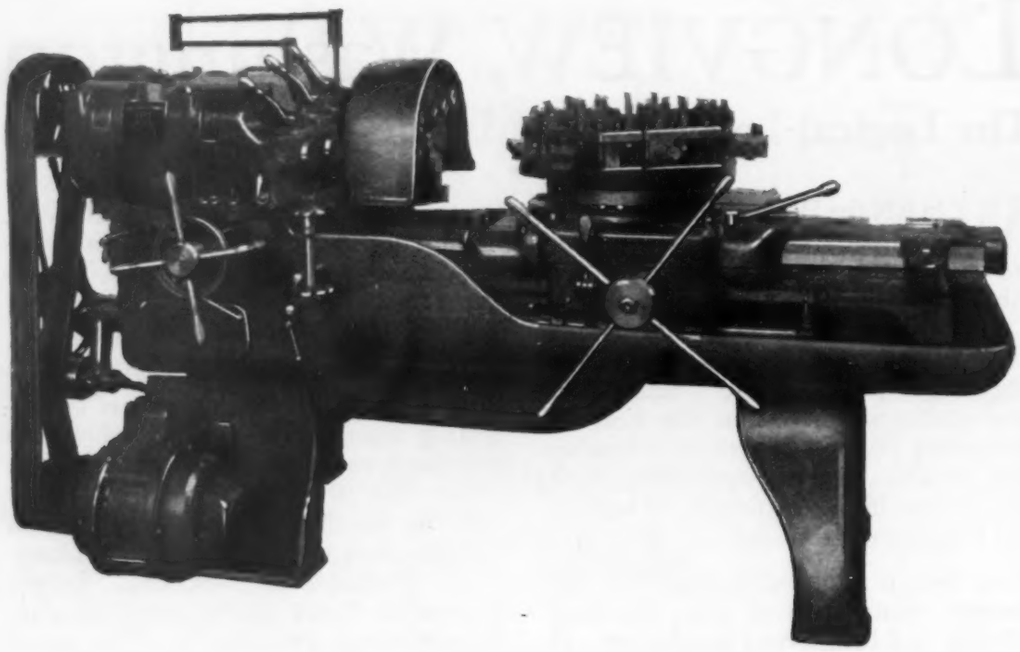
Name _____

Address _____

J&L
JONES & LAMSON

J&L
JONES & LAMSON

WHEN Gertrude Ederle offers to meet all comers in a competitive swim of the English Channel, we recognize the real championship spirit. The word means ability to excel consistently.



J&L Turret Lathes excel *consistently* in the work of a turret lathe—the turning of duplicate parts in small and medium sized lots.

They do so because they are simple in operation and easy to handle; because their standard tools are quickly set up for all jobs, and because each of the multiple tools being a hog for work the output of the machine is unexcelled.

JONES & LAMSON MACHINE COMPANY

Springfield, Vermont

Mult-Au-Matic News

BRIDGEPORT, CONN., SEPT. 30, 1926

BULLARDS WIN AGAIN

85 to 16

The volume of work produced by 85 Turret Lathes is now coming through from 16 Mult-Au-Matics. This, briefly, is the story obtained by a careful check of production methods and costs made by the Nielsen Engineers in one of the large automotive plants in the Middle West.

The new equipment releases seven-eighths of the floor space previously occupied by the Turret Lathes and in spite of the fact that one operator was used for four lathes, the actual saving in cost showed a reduction of over 28%.

The conditions under which these machines are being used do not comprise steady operation on one piece, but include the changing over of tool settings from one job to another. The customer speaks very highly of Bullard Engineering Service and is naturally making plans at the present time to increase his equipment.

One of the foremost advantages gained by the Mult-Au-Matic Method is the margin of lower cost which not only pays an excellent return on the investment, but renders additional business easily obtainable.

BRIDGEPORT BULLARD CONNECTICUT

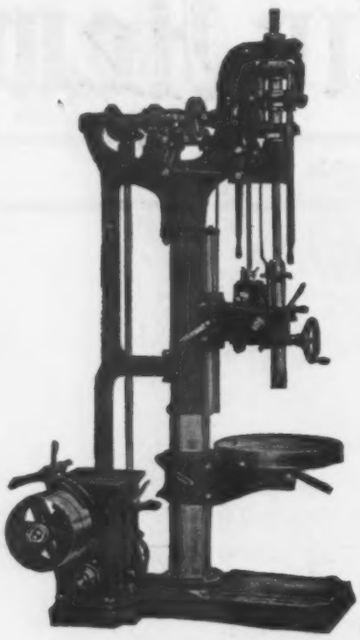
BULLARD

EQUIPMENT UNITS

The Maxi-Mill-The Vertical Turret Lathe-The Mult-Au-Matic-The Comb-U-Matic

CINCINNATI UPRIGHT DRILLING MACHINES

Profit Builders



There are many times, even in "good shops," where machines are tearing down profits every minute they are run. They may produce but they eat up the benefits in maintenance and slow speed.

But not so with Cincinnati Bickford Upright Drilling Machines. There are over 25,000 Cincinnati Upright and Cincinnati Bickford Radial Drilling Machines in use today, every one capable of high speed production. Add one to your shop equipment and note the difference in your drilling costs. They are builders of profits, always.

Write for a catalog.

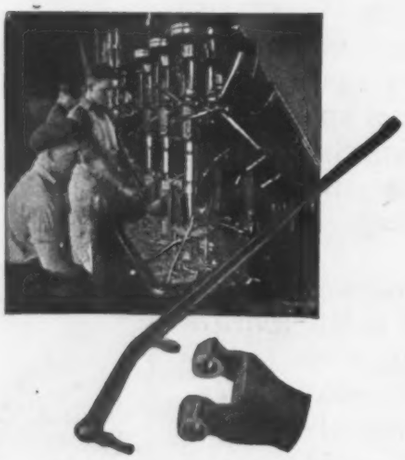
CINCINNATI MAKES MORE MACHINE TOOLS IN LARGER VARIETY THAN ANY OTHER CITY IN THE WORLD. TO SEE ANY UP-TO-DATE MACHINE TOOL COME TO CINCINNATI

The Cincinnati Bickford Tool Co.

Oakley, Cincinnati, Ohio

FOUNDED IN 1874 AND GOING STRONGER THAN EVER.

Self-Oiling All-Geared Drills



This Unit Makes SPEED!

Here is an automobile part going through three successive operations. Our Gang Drill is being pushed to the limit but it stands the gaff. When you want high production speeds with low drilling costs use Self-Oiling All-Geared Drills.

Write for catalog "I."

BARNES DRILL CO., Inc., 1907

815-831 Chestnut St. Rockford, Illinois, U. S. A.

Agents for Great Britain: Burton, Griffiths & Co., Ltd., London, E. C. **Belgium:** G. & F. Limbourg Freres, Brussels. **France:** Burton Fils, Paris. **Japan:** Roku-Roku Shoten, Tokyo. **Spain:** Juan Llopart, Barcelona, and Anitua & Charola, Eibar.

HORIZONTALS, UPRIGHTS AND GANG DRILLS

Established in 1872

W.F. and John Barnes Co.

ROCKFORD, ILLINOIS

NATCO — THE WHOLE STORY IN ONE WORD

The "Hole" Story in One Word

THE NATIONAL Automatic Tool Co.

RICHMOND, IND.

Largest Exclusive manufacturers Multi-Drillers and Multi-Tappers

Write for full information.

LELAND-GIFFORD COMPANY

Worcester, Mass.

Drilling Machinery

Belt and Motor Spindle

One to Six Spindles

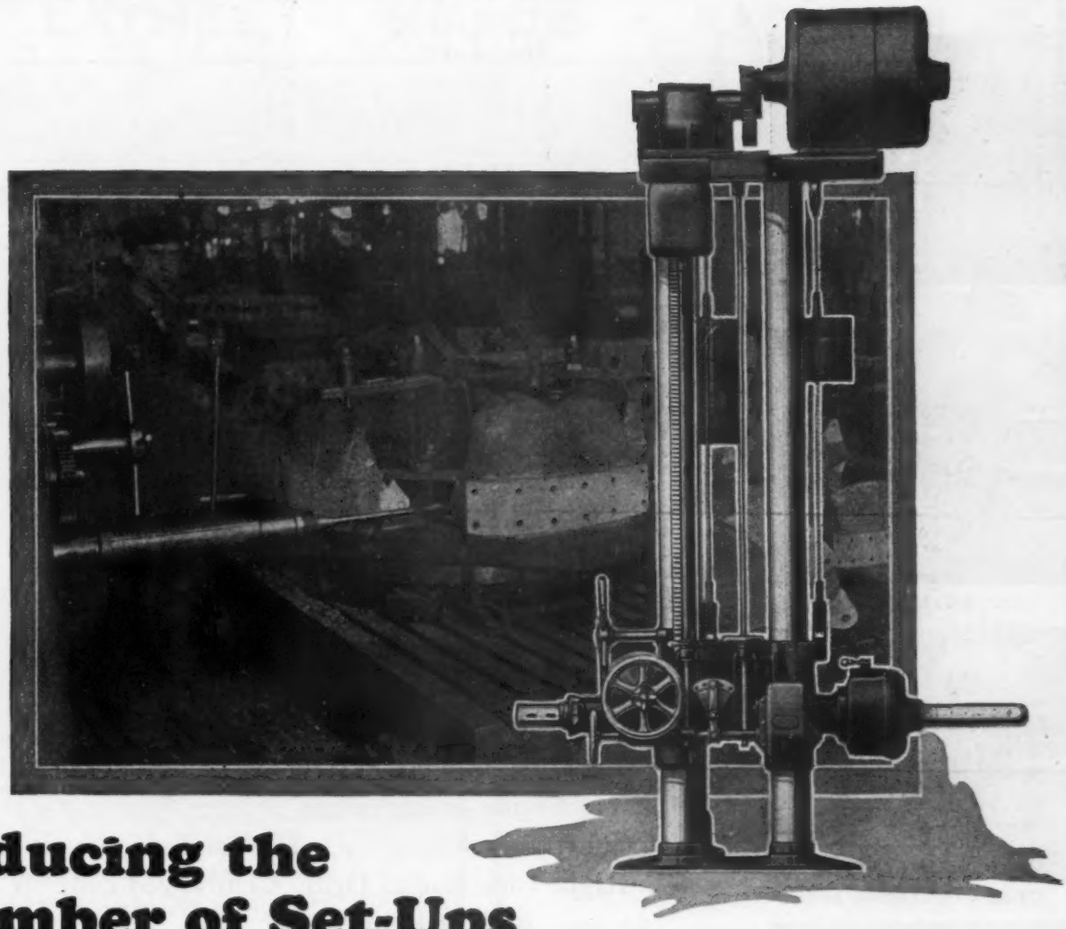
Tapping Attachments and Multiple Heads

GREENFIELD TAP AND DIE CORPORATION

GREENFIELD, MASS. U.S.A.

See our regular advertisement in the first of the month issues.

MACHINE TOOLS, TAPS AND DIES, SCREW PLATES, REAMERS, TWIST DRILLS, GAGES, PIPE TOOLS.



Reducing the Number of Set-Ups

Drilling and Boring of Large, Bulky Pieces Handled in Much Less Time

ALL pieces, large and small, are quickly and easily handled by the Ryerson Horizontal. The movable worktable and great vertical range of the spindle permit work over an extremely large area without resetting the job. With a simple rotary table four sides of a casting can be worked from the one setting; with a universal table accessible sides in any plane can be machined.

The use of movable worktables in conjunction with this horizontal type of drill saves the time often lost between jobs. Another job can be set while one is in operation so that the drill is kept continually busy.

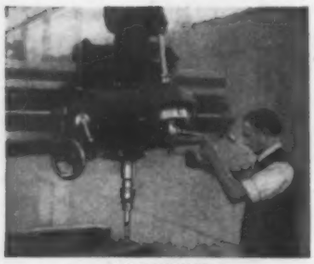
Other features of the Ryerson Horizontal that are helping reduce the time on difficult drilling and boring jobs are described in Bulletin 4051. Write for a copy.

JOSEPH T. RYERSON & SON INC.
Established 1842

PLANTS: CHICAGO ST. LOUIS CINCINNATI DETROIT BUFFALO MILWAUKEE BOSTON NEW YORK
BRANCH OFFICES: Minneapolis Cleveland Pittsburgh Denver Tulsa Louisville Houston Los Angeles San Francisco

RYERSON MACHINERY

LATHES	PUNCHES	SMALL TOOLS	HORIZONTAL DRILLS	SERPENTINE SHEARS
DRILLS	SHEARS	FRICTION SAWS	POWER HAMMERS	HYDRAULIC MACHINERY
PLANERS	MOTORS	BEVEL SHEARS	BENDING ROLLS	SPRING SHOP EQUIPMENT
SHAPERS	BULLDOZERS	MILLING MACHINES	PNEUMATIC MACHINERY	FLUE SHOP EQUIPMENT

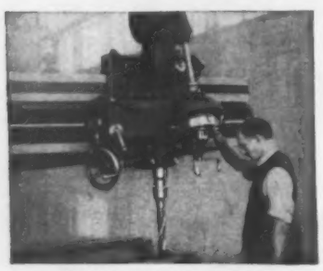


TAPPING

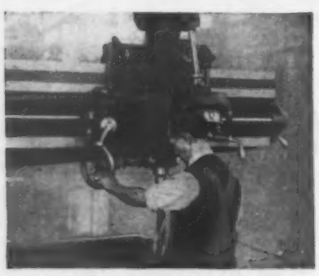
ENGAGING FEED

CLAMPING COLUMN

SETTING POWER FEED



FINE HAND FEED



TRAVERSING HEAD

Hike

But on the open road

Hiking's good fun when you do it for pleasure or health. It's a dead loss in the machine shop. Wandering around an old-fashioned machine tool isn't particularly pleasant for the operator or profitable for the management.

There's no hiking back, forth and around with a Right Line Radial Drill. Centralized controls do away with walking.

The operator may unclamp the column, swing the arm to the next place to drill and clamp the column. He may vary the cutting speed, move the head along the arm, change the feed and throw in the power feed—all with his feet under no obligation to move unless he feels like it.

This centralized control really saves time. Then the strong rigid construction of the Right Line Radial, its speed and power make the drilling of holes fast, accurate and consequently as low in cost as possible.

Write to us for full particulars of the Right Line Radial Drill. Tell us the kind of drilling and the quantity you do and let us tell you if you should have a Right Line.

The Niles Tool Works Company

Division Niles-Bement-Pond Company

Hamilton, Ohio

LATHES · SHAPERS · RADIALS

THE AMERICAN TOOL WORKS CO.

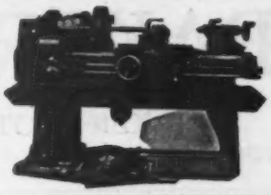
CINCINNATI, U.S.A.

MONARCH LATHES

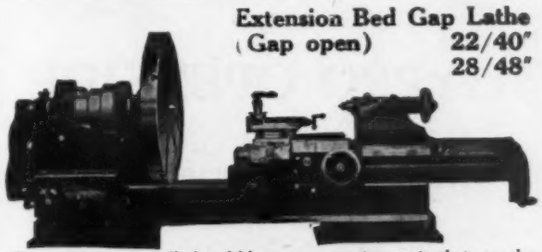
The price is right and complete satisfaction is guaranteed.
All sizes and styles. From 9" to 30" swing.
Good Business Ahead

The Greatest Economy Is in Spending for Constructive Investment.

THE MONARCH MACHINE TOOL CO. 106 Oak Street Sidney, Ohio



Extension Bed Gap Lathe
(Gap open) 22/40"
28/48"



There is really no limit within reason to the work that can be done on this type of Gap Lathe. This tool enables the operator to at all times have a lathe ready for any job, without tearing down and setting up. Especially adapted for: Coal Mines, Railroad Shops, Steel Mills, Public Service Corporations, Shipbuilding, Machine Tool Shops, Oil Refineries, Sugar Refineries and all large shops for repair work.

Let Us Send You a List of Users

THE RAHN-LARMON CO. CINCINNATI, OHIO

GISHOLT

3L and 4L Turret Lathes

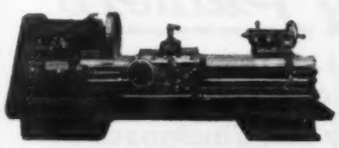
With all geared head—full swing side carriage and fixed center or cross sliding turret—all shafts on ball bearings.

21" swing with 4⅜" spindle—28" with 9¼" spindle—10½" or 12¼" spindle.

GISHOLT MACHINE CO.

1200 E. Washington Ave., Madison, Wis.

GREAVES-KLUSMAN



The very latest in heavy duty Engine Lathes. Noted for precision and labor-saving conveniences.

THE GREAVES-KLUSMAN TOOL CO.
Cincinnati, Ohio
U. S. A.

International Machine Tool Co.

THE LIBBY TURRET LATHE

INTERNATIONAL MACHINE TOOL CO.
INDIANAPOLIS INDIANA

REED-PRENTICE CORP.

MACHINE TOOLS

WORCESTER MASS., U.S.A.

BRANCH OFFICES:
1810 Singer Bldg., New York, N. Y. 3-245 General Motors Bldg., Detroit, Mich.

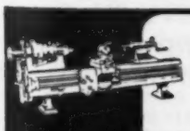
Steinle Turret Machine Co.

THE FULL SWING SIDE CARRIAGE
TURRET LATHE

STEINLE TURRET MACHINE CO.
MADISON WISCONSIN U. S. A.

Rivett

PRECISION LATHE



An outstanding machine tool known the world over for 30 years. Nothing else like it or as good. Write for bulletin.

RIVETT LATHE AND GRINDER CORP.
Brighton, Boston, Mass.

GOSS & DeLEEUW
Multi-Spindle
CHUCKING
MACHINES

Make Your Chucking Production Profitable

For details see our page in the Sept. 9th issue

THE GOSS & DeLEEUW MACHINE CO.
New Britain, Conn.

CINCINNATI ACME

Turret Machinery

Full Range of All Types and Sizes

THE ACME MACHINE TOOL CO.
Cincinnati, Ohio

Cone
4-Spindle
Automatics

Are economical and accurate producers of screw machine parts up to 3½" to 7". They cut costs, increase production, boost profits. Write for particulars.

CONE AUTOMATIC MACHINE CO., Inc., Windsor, Vermont

Agents for Michigan Territory: J. C. Austerberry, 684-690 E. Congress St., Detroit, Mich. Chicago Representative: John H. Glover, 2130 N. Monard Ave. Ohio Representative: H. B. Martin, 10613 Clifton Blvd., Cleveland, O.

Boring, Drilling, Milling, Precision?
Horizontal Boring, Drilling and Milling Machine

Specify The **LUCAS** "Precision"

LUCAS MACHINE TOOL CO.
CLEVELAND OHIO, U. S. A.
Lucas Patent Power Forcing Press

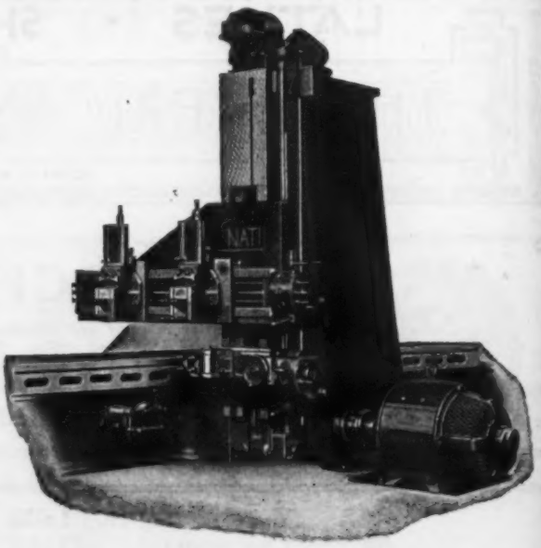
BAKER

Vertical Boring and Drilling Machines
Cylinder Borers
Keyseaters

BAKER BROTHERS, Inc.
TOLEDO OHIO, U. S. A.

BROACHING TOOLS and BROACHING MACHINES
OF ALL SIZES AND DESCRIPTIONS
Quality and Service
AMERICAN BROACH & MACHINE COMPANY
Ann Arbor, Michigan

The Improved No. 3 Lapointe Duplex Broaching Machine
Guaranteed to pay for itself in one year's time by increased production.
LAPOINTE MACHINE TOOL COMPANY
Hudson, Mass., U. S. A.



HYPRO OPENSIDE
THE LEADING OPENSIDE PLANER, FEATURES OF REAL MERIT NOT TALKING POINTS
SELECTIVE DIAL FEED — RAIL CLAMP
RAPID TRAVERSE—FORCED LUBRICATION
THE CINCINNATI PLANER CO.
CINCINNATI, OHIO, U. S. A.

CLEVELAND OPEN SIDE PLANERS
The Counterbalance for the Side Head is carried on a heavy plow steel cable, a great many times the strength required, and the counterweight is inside the Column, out of the way of the operator.
Over 1070 installations.
Send for descriptive circular.
Power Rapid Traverse; Single Turn Rail Clamp; Automatic Trip to Rail Raising Mechanism; Improved Head Clamp; Herringbone Gears on Intermediate Reduction. Forced Feed Lubrication to Vees if desired.

26" to 72"

THE CLEVELAND PLANER COMPANY
ESTABLISHED 1900
3148 Superior Avenue, Cleveland, Ohio

Gray Planers
FOR MAXIMUM SERVICE
Double-Housing, Openside and Switch Planers
The G. A. Gray Co., Cincinnati, Ohio

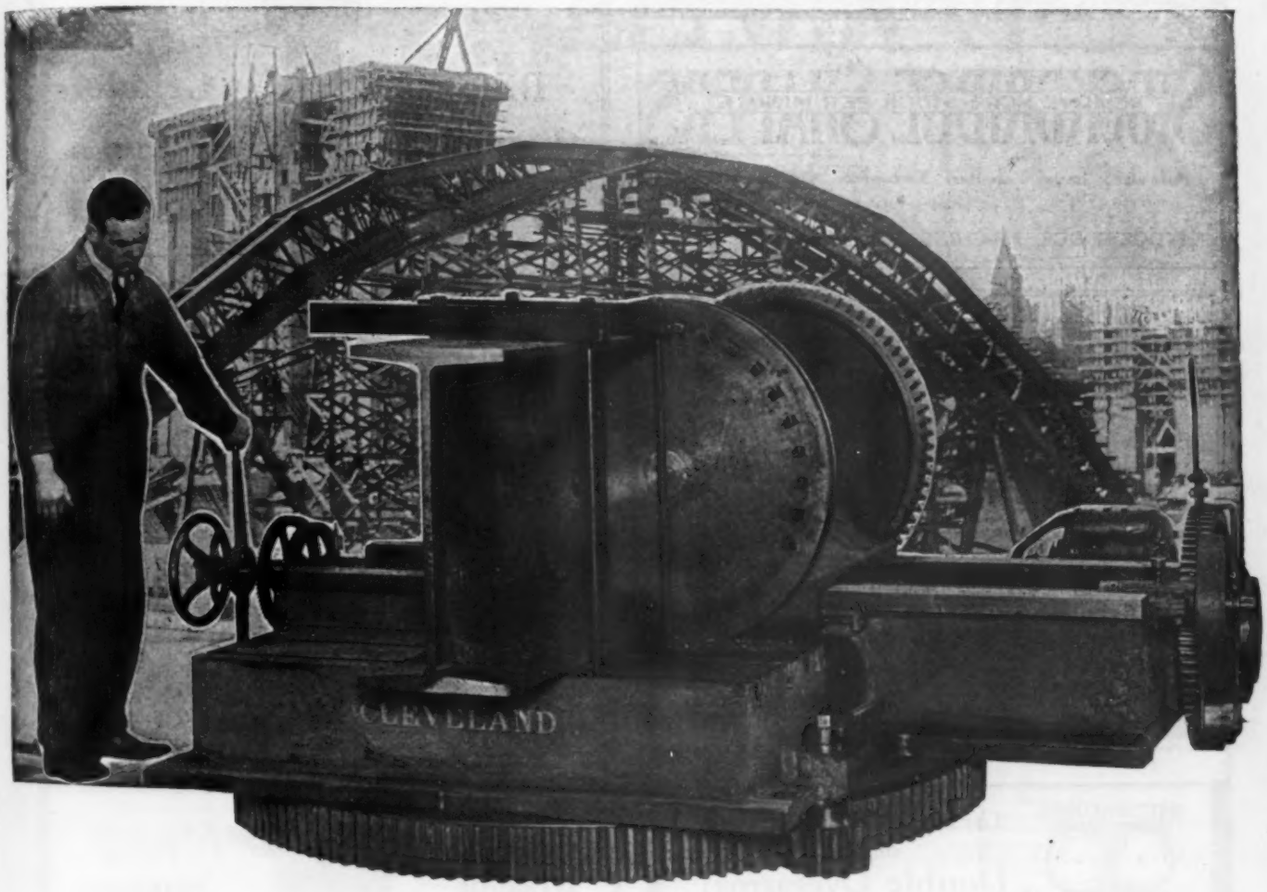
NEWARK GEAR CUTTING MACHINE CO.
Henry E. Eberhardt, President
MANUFACTURERS OF
GEAR CUTTING MACHINES
GEAR HOBBING MACHINES
73 PROSPECT AVE., NEWARK, N. J.

THE LIBERTY MACHINE TOOL CO.
HAMILTON, OHIO
MANUFACTURERS OF
STANDARD-OPENSIDE AND FROG AND SWITCH PLANERS

Columbia SUPERIOR
HEAVY DUTY SHAPERS
TOOL AND CUTTER GRINDERS
Special Machinery — Contract Work
THE COLUMBIA MACHINE TOOL CO.
HAMILTON, OHIO

THE OHIO MACHINE TOOL CO.
SHAPERS
16" to 36" Inclusive
PLANERS
24" x 24" to 48" x 42" inclusive
Established 1887
KENTON, OHIO

CLEVELAND



CLEVELAND PRODUCTS

Punches
Shears
Bending Rolls
Plate Planers
Wall Radial Drills
Rotary Planers

POWER PRESSES

Punches
Dies
Rivet Sets
Chisel Blanks
Markers
Coupling Nuts

TURN IT FROM ONE JOB TO ANOTHER

With this Cleveland Rotary Planer there is no need of putting different jobs in the same pile. Pile them separately, then revolve the planer to each pile as soon as another is finished. There are no clumsy handling propositions around when the Cleveland Rotary Planer is used.

Write for a special bulletin.

NEW YORK
30 Church St.

CHICAGO
80 E. Jackson Blvd.

THE CLEVELAND PUNCH & SHEAR WORKS CO.
Main Office & Works · CLEVELAND, OHIO
PITTSBURGH - CHICAGO - PHILADELPHIA - NEW YORK

PHILADELPHIA
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GOULD & EBERHARDT

ESTABLISHED 1851

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NEWARK, N.J., U.S.A.

GEAR CUTTING MACHINES

STOCKBRIDGE SHAPERS

"REMOVE MORE STOCK PER MINUTE"

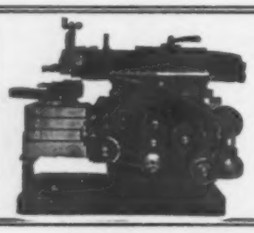
All sizes have Patented Two-piece Crank Motion
Save time—money.

STOCKBRIDGE MACHINE CO., Worcester, Mass.

SHAPERS simply designed but accurate and efficient

12-in. to 32-in. Stroke (Inclusive)

THE SMITH & MILLS COMPANY
Cincinnati, Ohio, U. S. A.



Thirty years of concentration on one machine tool has produced the BEST

KELLY
CRANK SHAPERS

THE R. A. KELLY COMPANY
Xenia, Ohio
Ask for catalogue.

Dillon Electric Grinders and Buffers

Noiseless—High Speed

These two features are only two good points of many in Dillon Electrics. For high speed production on small tools, castings and special finishing of all kinds you could not do better than to install Dillon Electric equipment.

Medium Duty Grinders and Buffers made in ½, 1 and 2 H.P. capacities. Pedestal or Bench Type.

Heavy Duty Grinders and Buffers made in 3, 5 and 7½ H.P. capacities. Pedestal type only. Alternating or Direct Current.

The Dillon Electric Co.

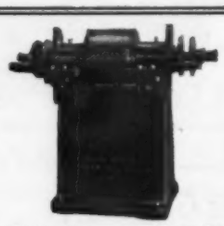
Canton Ohio

MILWAUKEE MILLING MACHINES

The Milling Machine *with the* Double Overarms!

KEARNEY & TRECKER CORPORATION
5930 National Ave. Milwaukee, Wis.

Motor Driven
RANSOM GRINDERS
Ball Bearing



Every unit of the Ransom line of Grinding Machines is designed and built to give the ultimate in satisfactory, economical service. Standard equipment includes G.E. Motors, large S.K.F. Self Aligning Ball Bearings, extra large high grade arbor steel spindles. Catalog describes many exclusive features. Send for it today.

Ransom Manufacturing Company
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KEYSEATERS and CUTTERS

THE WEST TIRE SETTER CO.
POWER HAMMERS and HYDRAULIC PRESSES
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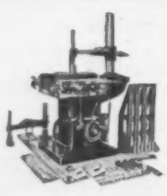

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Keyseaters

Stationary type—18-24 and 30" stroke. Built to endure, and to economically perform every Key-seating operation. Send for Bulletin IF.

MORTON MFG. CO.
Muskegon Heights, Mich.

THOMPSON

UNIVERSAL GRINDING MACHINES

SEND FOR BULLETIN No. 16

THE THOMPSON GRINDER CO.

SPRINGFIELD - - OHIO

KNIFE GRINDER

A MACHINE that is designed for grinding light knives, such as planer, paper, cottonseed oil and any light straight machine knife.

Write for further information.

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Bridgeport, Ct.
Send for Blue Catalog.

ABRASIVE SURFACE GRINDER

Either Horizontal or Vertical Spindle Type
Countershaft or Motor Drive

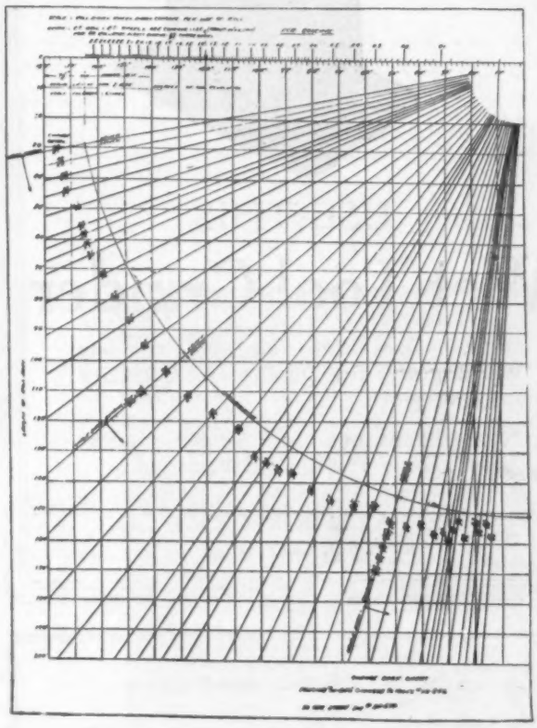
Get our bulletin for particulars

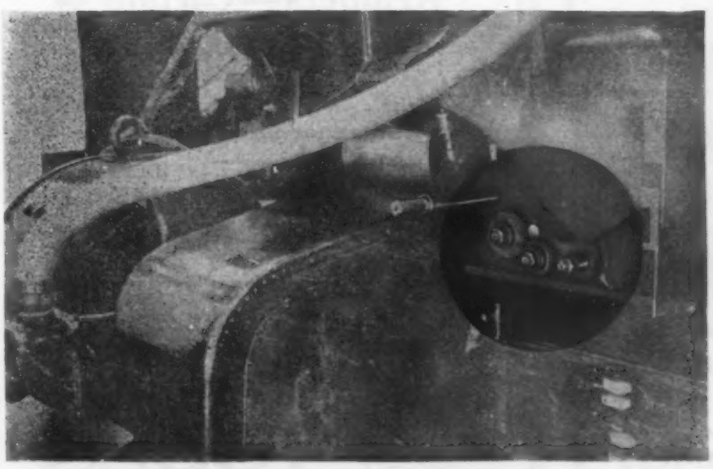
ABRASIVE MACHINE TOOL CO. East Providence, R. I.

GUESS WORK ELIMINATED

When it is necessary to grind a roll with a definite amount of crown or concavity there is no need to "cut and try" on the Landis Roll Grinder with the improved built in cambering mechanism.

The chart illustrated, which is furnished with each machine, shows at a glance which pair of change gears to use to produce exactly the required shape.





The gears are readily accessible and are easily and quickly changed. A sufficient range of gears is furnished so that practically any amount of crown or concavity can be obtained from the maximum to the minimum range of the machine.

LANDIS TOOL COMPANY, Waynesboro, Penna.

New York Office, 30 Church St. Chicago Office, 618 W. Washington Blvd. Detroit Office, 5928 Second Blvd.

Domestic Agents—Hallidie Machinery Company, Seattle; Smith-Booth-Usher Co., San Francisco and Los Angeles; Peden Iron & Steel Co., Houston; Fulton Supply Co., Atlanta; F. C. Richmond Machinery Co., Salt Lake City.; Moore Handley Hardware Co., Birmingham.

Canadian Agents—F. F. Barber Machinery Company, Toronto, and Williams & Wilson, Ltd., Montreal.

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USE THIS

Wet Tool Grinder

It will save time, reduce your costs and improve the Quality and Quantity of your work.

Some shops use them in large numbers. Have you one of them?

THE TAYLOR & FENN CO.
HARTFORD, CONN., U. S. A.

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BLANCHARD GRINDERS

Blanchard Vertical Surface Grinders for production and accuracy. See page ad in the 2nd issue each month.

THE BLANCHARD MACHINE CO.
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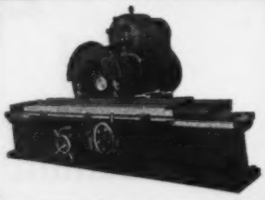

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A Quality Product

The Bridgeport Safety Emery Wheel Co., Inc.
181 W. Broad St. Bridgeport, Conn.

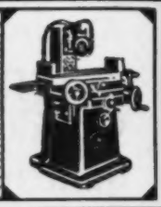
Manufacturers of Precision

GRINDING MACHINES

Since 1900

Surface Grinders, Tool and Cutter Grinders and New Yankee Drill Grinders

WILMARTH & MORMAN CO.
1190 Monroe Ave., N.W. Grand Rapids, Mich.



Flexible Shaft Grinders
All Types
All Sizes

Built Only by

STOW MANUFACTURING CO., INC.
BINGHAMTON, NEW YORK

For True Economy in Flat Surface Finishing, Investigate

Gardner Disc Grinders

Gardner Machine Company
412 E. Gardner St., Beloit, Wis., U. S. A.

Twist Drills—Hobs
Milling and Gear Cutters
Reamers—Carbon or High Speed Steel

Specialists in laying out and designing Cutters for production work.

UNION TWIST DRILL CO.
ATHOL, MASS.

BELT GRINDER

Sands, Grinds, Polishes, Squares Sides, Makes Angles.

For SURFACING

Motor driven from Lamp Socket

Porter-Cable Mach. Co.
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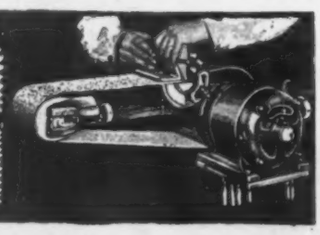


GRIND WITH A HEALD AND BE SURE

Internal — Surface and Cylinder Grinders

THE HEALD MACHINE COMPANY
26 New Bond St. Worcester, Mass.

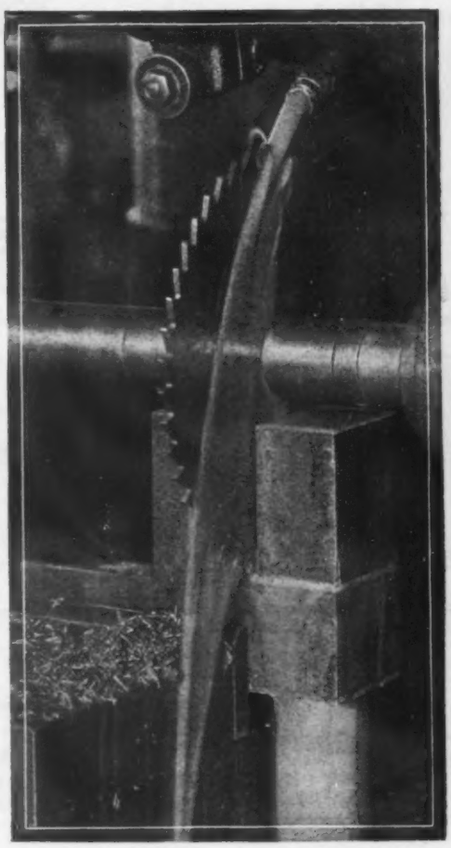
NATIONAL TWIST DRILL & TOOL CO.

Twist Drills, Cutters Reamers and Special TOOLS

NATIONAL TWIST DRILL & TOOL CO.
Detroit, U.S.A.

BUCKEYE "999"

THE BUCKEYE TWIST DRILL CO. ALLIANCE, OHIO



Profits are earned or lost at the "Production Point"

THE "production point" of your milling machine is at the cutter. No matter how modern, powerful, or accurate your machine may be, your profits depend finally on the work of the cutters at the "production point."

Seventy-five years of cutter making — and cutter using—has produced the modern Brown & Sharpe Cutter, the best insurance of profitable performance at the "production point."

The Brown & Sharpe No. 30 catalog is a buying guide for quality equipment. It describes over 1500 sizes and styles of cutters and Hobs and contains considerable cutter information. You should have a copy for reference purposes. If your dealer cannot furnish a copy, write us direct.

BROWN & SHARPE

BROWN & SHARPE MFG. CO. PROVIDENCE, R. I., U. S. A.

MANUFACTURERS *of* MODERN MACHINE TOOLS, CUTTERS *and* SMALL TOOLS

The MORSE

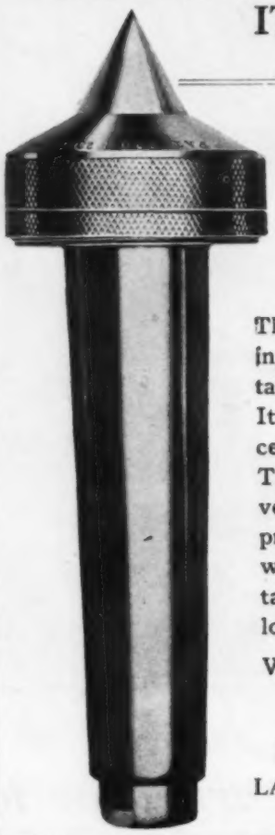
High Speed Forged Type Drills

With the over-size Shank, are meeting the demand of production jobs for Drills of the Staunchest Character.

MORSE High Speed and Carbon Tools Sold by Reliable Dealers Everywhere.

MORSE TWIST DRILL & MACHINE CO. NEW BEDFORD, MASS., U.S.A.

A MACHINE IS NO BETTER THAN ITS TOOLING



NIELSEN BALL BEARING LATHE CENTER

The Nielsen Ball Bearing Lathe Center rotates with the work. It eliminates costly center grinding delays. The long spindle prevents wobbling and prevents excessive wear. Ball bearings take thrust and radial load.

Write for a circular.

NIELSEN, INC.
LAWTON, MICHIGAN

Twist Drills, Reamers

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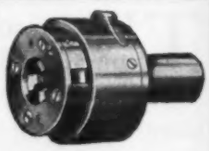
Screw Extractors

CLE-FORGE HIGH SPEED DRILLS

The CLEVELAND TWIST DRILL COMPANY CLEVELAND NEW YORK-CHICAGO-LONDON

H & G DIE HEAD

CUT THREADS BETTER QUICKER CHEAPER



Sizes and Styles for All Machines

See our page for detailed information on page 80 of September 9th issue.

THE EASTERN MACHINE SCREW CORPORATION
21-41 Barclay St. New Haven, Conn.

SPECIAL TAPS

Solid or with Inserted Chases

May We Supply You?

THE PIPE MACHINERY COMPANY
930 E. 70th ST. CLEVELAND, OHIO

Dies—Self Opening, Adjustable
Pipe Cutting and Threading Machines
Taps—Collapsible, Adjustable
Thread Cutting Machines

Descriptive Catalog?

MURCHEY MACHINE & TOOL CO.
951 Porter St., Detroit, Mich.

For Smooth Accurate Holes

SMOOTH-KUT

Expansion Reamers

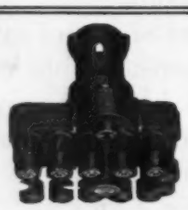
The full spiral flutes *shear* the metal, producing a finished hole.

Insist on the name Smooth-Kut, beware of inferior imitations.

Sold singly and in sets

Millersburg Reamer and Tool Co.
Millersburg, Pa.

"Patent issued April 7, 1925."



Get the Work Out!
With U. S. Multiple Drill Heads

Keep the work moving in your shop by using U. S. Multiple Drill Heads. Rapid drilling of many holes is their strong point. Send us blue prints of your drilling operations.

THE U. S. DRILL HEAD CO.
1956 West Sixth St.,
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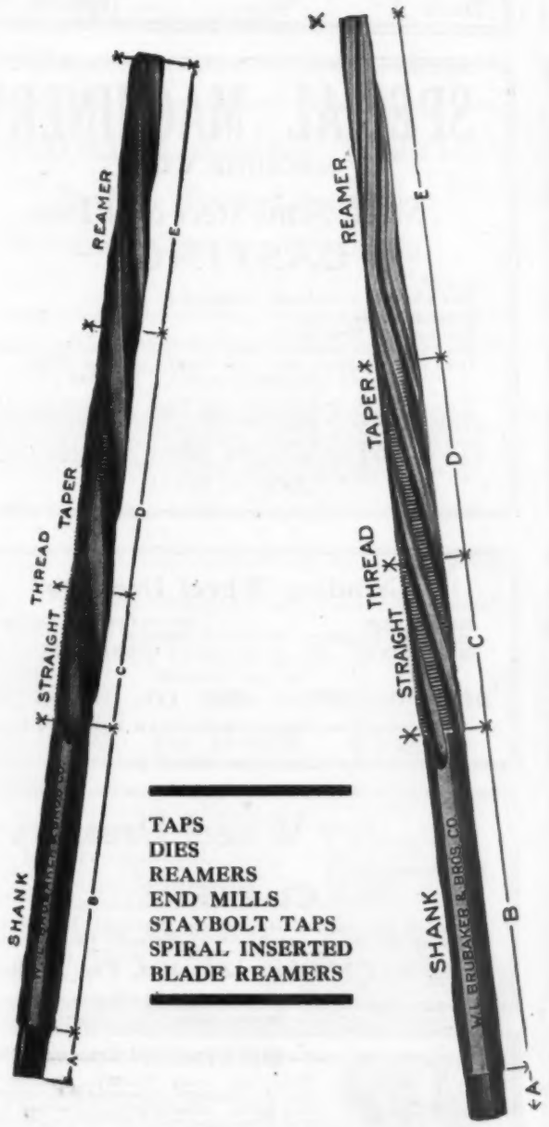
Kingsbury Automatic Sensitive High Speed Drill Heads

can be furnished in multi-spindle vertical, horizontal and turret type machines.

Write for catalogue of these high production machines of ⅝" capacity.

Kingsbury Manufacturing Co.
Keene, New Hampshire

"Net Profit" Always Approves of Brubaker Taps



The spiral fluted staybolt tap was an eye opener when it first made its appearance on the market. Later on we added the duplex spiral to the reamer end of the tool, and caused some more excitement among tap users.

These are good tools—ask any railroad man—and they reflect the vast experience we possess in making good small tools.

Considering that experience is a big factor entering into the making of successful small tools, safeguard your profits by using Brubaker Tools extensively for tapping, reaming, milling, etc. "Net Profit" always approves of Brubaker Tools.

W. L. BRUBAKER & BROS. CO.

FACTORY: MILLERSBURG, PA.

SALES OFFICE: 50 CHURCH ST., NEW YORK, N.Y.

NICHOLSON

Expanding Mandrels

Arbor Presses — Reamer Holders
Shaft Couplings — Steam Traps

Four-way Air, Steam or Water Valves

W. H. NICHOLSON & COMPANY 115 Oregon Street, Wilkes-Barre, Pa.

Perform 4 Engine Lathe Operations with 1 Set-up by using

McCROSKY TURRETS

Bulletin, free and postpaid.

McCROSKY TOOL CORPORATION
Meadville, Pa., U. S. A.

THE EAGLE ANVIL

FISHER PATENTED

First Anvil Made in America

The Standard For Over 80 Years. Combines a gun iron body with a tool steel face, made to last and satisfy.

Established 1843

FISHER & NORRIS

"Eagle" Anvil Works

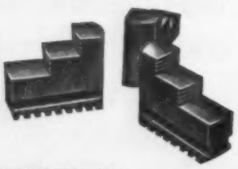
Desk 1 Trenton, N. J.

UNION

UNIVERSAL GEARED SCROLL CHUCKS ARE ACCURATE AND SUBSTANTIAL

We furnish this chuck regularly with iron or steel bodies in three or four jaw styles.

Two Sets of Jaws



UNION MANUFACTURING CO.
Main Office: New Britain, Conn.

Branch Offices Where Stock is Carried

New York Office 26 Cortlandt St. — Chicago Office 26 S. Jefferson St. — Cincinnati Office 306 Sycamore St. — San Francisco Office 770 Folsom St.

Makers of a Complete Line of Chucks.

SPECIAL MACHINERY

MACHINE WORK

Steel, Semi-Steel and Iron

CASTINGS

Our plant is completely equipped to produce:

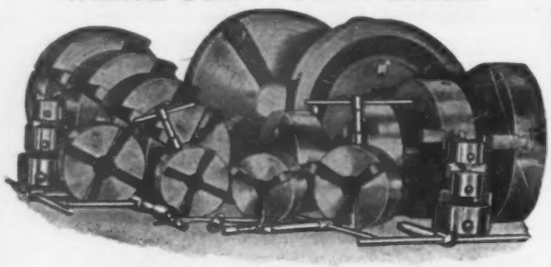
Blast Furnace Parts
Rolling Mill Machinery
Steel Castings (up to 10 tons)
Grey Iron Castings (up to 15 tons)
Annealing Boxes
Shafting
Special Machinery
Chilled Rolls
Patterns

We also do all kinds of Machine Work, Roll Grinding, Machine Building to Specifications. Write for an estimate.

THE ADAMSON MACHINE CO.

AKRON, OHIO

Whiton Geared Scroll Chucks



They are available with either iron or steel bodies and in three or four jaw types. The "solid body" construction gives a rigid, accurate and durable chuck.

Lathe *and* Drill Chucks

THE D. E. WHITON MACHINE CO.

New London Connecticut

Grinding Wheel Dressers

DIAMONDS
DIAMO-CARBO
MAGAZINE
HUNTINGTON (8 Sizes)
SHERMAN
DESMOND HEX

Get Our Catalogue.

DESMOND-STEPHAN MFG. CO., Urbana, Ohio

The Canadian Desmond-Stephan Mfg. Co., Ltd.
Hamilton, Ont.

Emery Wheel Dressers

Two Sizes Nos. 1-2

CUTTERS

We make the regular Huntington (Pattern) for all sizes. Roughing for No. 1 and 2. Paragon for No. 1 only.

GEO. H. CALDER, Lancaster, Pa., U. S. A.

ARMSTRONG BROS.
PIPE TOOLS

STOCKS
DIES
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CUTTERS
STILLSON
and CHAIN
WRENCHES

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DROP FORGED TOOLS

LATHE DOGS, TOOL HOLDERS
CLAMPS, WRENCHES, RATCHETS

Full line Catalog sent on request

ARMSTRONG BROS. TOOL CO.
309 N. Francisco Ave., CHICAGO, U.S.A.

DICKINSON "Diamond"

Tools for truing **Large, Coarse and Hard Emery Corundum, Carborundum, Alundum, Crystolon** or other abrasive wheels will give the **Greatest amount of service** with a **minimum of wear** on the **diamond.** Diamonds can be set in any style of holder desired. We have had a great many years' experience in the manufacture of Diamond tools and are thoroughly familiar with what is required of them.

THOS. L. DICKINSON, 34 Gold St., N. Y.
Established 1796. Successor to John Dickinson.

Cut bolts, rods and wire. Split nuts. Man power multiplied to make hard work easy. A style and model for every purpose. Tool dealers everywhere sell PORTER'S BOLT CLIPPERS.

PORTER'S Bolt Clippers The Time Savers

H. K. PORTER INC.
EVERETT, MASS.

See!

our full-page advertisement, issue September 16th, page 252.

The Sterling Grinding Wheel Co.
Tiffin, Ohio

New York—30 W. Broadway Boston—Winter Hill Section
Chicago—22 South Jefferson St

STERLING ABRASIVES

AND STERLING GRINDING MACHINES

WHEELS THAT GRIND

This means high-class service and lower grinding cost.

PITTSBURGH GRINDING WHEEL CO.

ROCHESTER, PA.

Thompson's Metal Cutting BAND SAW

in coil or cut and brazed to length

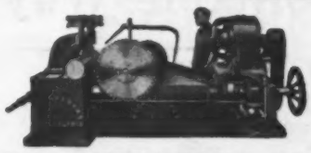
Trial BAND or HACK SAW sent on request.

The Henry G. Thompson & Son Co.
Established 1876
New Haven, Conn.

Westfield Grinding Wheels

Produce Unusual Results

Westfield Grinding Wheel Co.
Westfield Mass.



Cutting Off Machines for Sawing All Kinds of Metals

THE ESPEN-LUCAS MACHINE WORKS
FRONT AND GIRARD AVE., PHILADELPHIA, PENNA.

"Sterling" Cost Cutting Blades

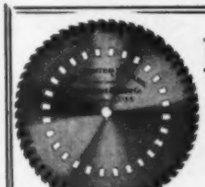
DIAMOND SAW AND STAMPING WORKS
BUFFALO, N. Y.

SLAG CUTTING-RIVET CUTTING

Save 50% of your labor cost by doing it the "Cincinnati Way" with the Cincinnati Slag Gun and the Cincinnati Rivet Cutting Gun. Practically all Steel Mills and Railroads have adopted the *"Cincinnati"* as *Standard*. Write for catalog of installations.

RIVET CUTTING GUN COMPANY
EAST THIRD STREET CINCINNATI, OHIO

HUNTER

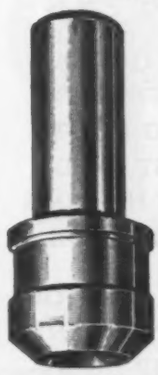


Saws
Rivet Sets
Chisel Blanks

For economical metal cutting use Hunter Saws; Inserted Tooth; Solid Tooth; Milling and Hot.
Hunter Rivet Sets and Chisel Blanks give long service. Send for catalog. Also High Speed Circular Metal Cut-off Sawing Machines.

Hunter Saw & Machine Co.
5660 Butler Street
PITTSBURGH PA.

"VANADIUM"



Air Hammer Rivet Sets

are inexpensive in the long run, as they outlast several sets of the ordinary kind. Never chip off or upset in the barrel of the hammer. Made of Vanadium steel. Shipped on approval.

Write for Literature.

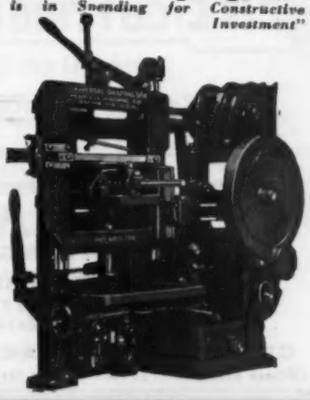
GEO. F. MARCHANT COMPANY

1422 So. Rockwell St., Chicago

Peerless High Speed Universal Shaping Saw

"The Greatest Economy is in Spending for Constructive Investment"

FASTER
MORE
ACCURATE
LESS BLADE
WEAR
GREATER
WORKING
RANGE



PEERLESS
MACHINE CO.
1218 16th St.
Racine, Wisconsin

The Policy of This Company

has not changed since it was started twenty years ago.

A high grade product at fair prices is our slogan.

THE CLEVELAND STEEL TOOL CO.
Punches. Dies. Chisels. Rivet Sets
660 E. 82nd St. Cleveland, O.

Chipping with Air Power is the Profitable Way

B-K (Boyer-Keller) Chipping Hammers are made in a wide variety of types and sizes for every chipping, calking, beading, scaling or light riveting job.

P-286-S

Chicago Pneumatic Tool Co.

Sales and Service Branches all over the World

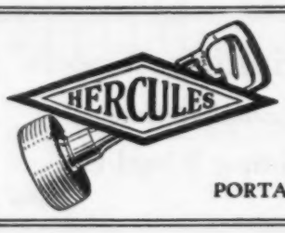
6 East 44th Street, New York, N. Y.

There is a Difference where you buy your Punches and Dies

ORIGINATORS WORLD'S LARGEST BALL BEARING PUNCH AND SHEAR MANUFACTURERS

Be sure the letter W is on all your punches and dies. They are made in our own factory and are genuine.

WHITNEY METAL TOOL COMPANY
100 FORBES STREET ROCKFORD, ILLINOIS



Portable Air Tools

Hercules Portable Air Tools are the most powerful tools for their weight ever built.

We will prove it in your shop for 30 days. Write us.

The BUCKEYE PORTABLE TOOL COMPANY
Dayton, Ohio

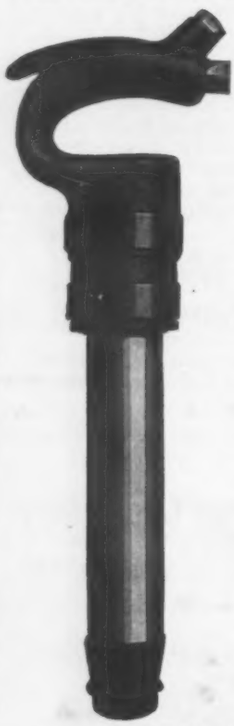
World's Oldest Makers of

Portable Electric Drills, Grinders, Polishers

Write for Catalog "P"

***The* UNITED STATES ELECTRICAL TOOL CO.**
CINCINNATI, OHIO

CLEVELAND



POCKET-IN-HEAD RIVETER.
THE LIGHTEST, FASTEST, AND HARDEST HITTING HAMMER MADE.

IT CUTS COST OF PRODUCTION AND SPEEDS UP DELIVERIES.

Made in sizes:—4", 5", 6", 8" and 9" stroke with Inside and Outside throttle Levers.

Capacities: ¼" to 1⅜" rivets in Boiler and Structural work.

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Curtis

Pipe Cutting and Threading Machines *give* Economy

Hand-Belt-Electric
Ranges ¼-2" to 8-16"

The Curtis & Curtis Co.
327 Garden St. Bridgeport, Conn.
Most Threads Per Dollar Invested

WILLIAMS

"Better Threads at Lower Cost"

Pipe and Bolt Threading Machines
Belt or Motor Driven—Range ⅛" to 24"
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PIPE THREADING AND CUTTING MACHINERY

HAND OR POWER

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PIPE THREADING MACHINES

Production—Precision—Portable

Latest and Most Advanced Types on the Market

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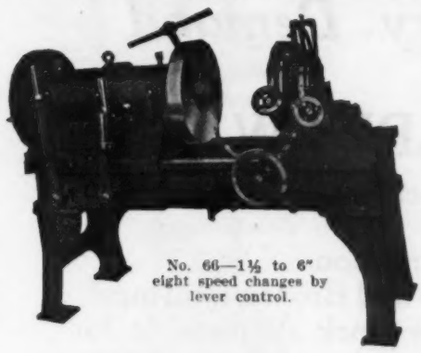

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Do It Better At Less Cost!

Jarecki Pipe Threading Machines have that habit—of doing a better pipe threading job quicker and therefore at less cost.

Take a look at the machines you are now using—quite likely you'll need Jarecki's.

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Combine Automatic Pointing and Threading with Economy

Automatic Pointing and Threading Machine

Capacity
Bolts and Cap Screws
3/16" to ¼" Diameter
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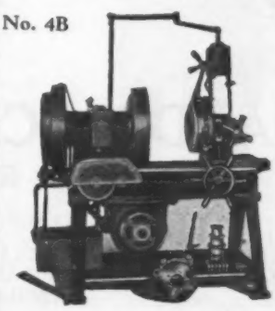
SAUNDERS

Improved Pipe Threading and Cutting Machine with New Type Die Heads and Individual Motor Drive, Also Furnished for Belt and Hand Operation.

No. 4B



Because it is so compact and durable it makes an excellent portable machine as well as a pipe shop machine. Cuts and threads pipe from ½" to 4". Our other pipe machines have capacities of ¼" to 18" inclusive and are made in different types to meet all conditions.

Your request for further information will be answered promptly. Send for catalog.

D. Saunders' Sons, Inc.
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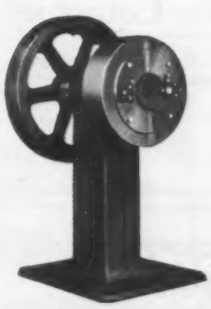

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—with 4000 forceful squeezing hammer blows per minute—makes metal tougher and more elastic. Send for booklet—"The Modern Art of Swaging."

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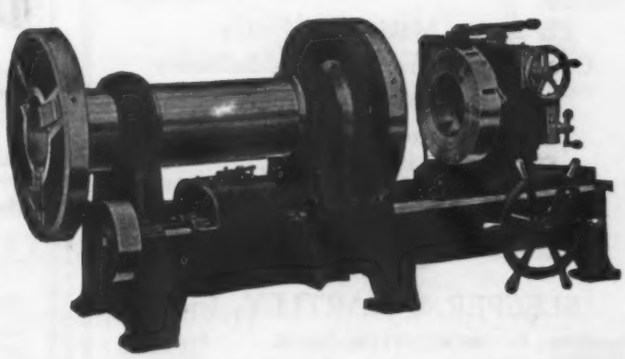
Looking for Better Pipe Threads?

B & K
Pipe Machines

will give you the finest, cleanest threads you ever experienced. And not only better threads but *more* threads in a given amount of time. Our new bulletins are ready.



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A Swager for Every Demand

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STANDARD SWAGERS

Capacities 0″ to 4¾″

Heavy Construction
Long Spindle and Bronze Bearings
Positive Door Lock Adjustable for Wear
All Wearing Surfaces Renewable
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Oil Reservoir Lubrication
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Builders of Machinery including Pipe Cutting-off Machines. Power Presses, Swaging Machines. Brazed Tubing Machinery. Also Grey Iron Castings.

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ROD MILLS ~ DRAW BENCHES ~
WIRE DRAWING AND HANDLING EQUIPMENT.
FOR STEEL, COPPER AND ALLOYS.

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Bolt Threaders, Nut Tappers, Heading Machines, Etc.

Write us for anything you want in the Bolt and Nut Machinery line.

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The Nilson Tilting Wire Reel in vertical position.

Foot-trip at base releases wire-carrying section to allow it to be lowered. Upright lever is pulled to release lock after coil is adjusted.

You Can Make Light of Heavy Lifting with the NILSON Tilting Wire Reel

Don't waste time, risk toes and lose temper loading wire reels in the old laborious way by lifting the heavy coil—let the reel do the work. The Nilson Tilting Wire Reel is the most efficient and easiest operated wire reel made. The wire-carrying section lowers to allow the coil to be shoved upon the prongs, then with little effort it is returned to the vertical position, a counterbalancing weight relieving the operator from heavy lifting.

The reel automatically locks in both positions. A foot trip releases it to be lowered and a lever unlocks it when the coil is in position.

The reel can be adjusted horizontally for feeding flat wire.

Loading the Nilson Tilting Wire Reel. One man can easily place the coil in position.

When the reel is in this position it is locked automatically. It cannot fly back and endanger the workman.

One man can do the loading.

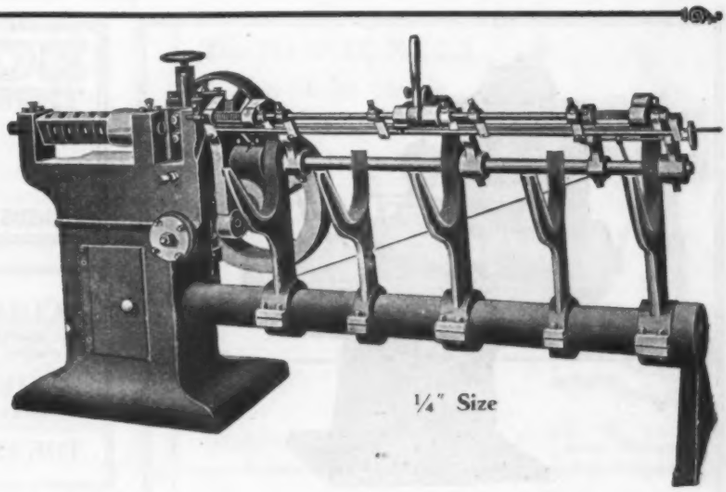
Increase the output of your wire-forming machines, decrease the cost of loading, and eliminate the danger of accident by installing the NILSON TILTING WIRE REEL at once.

Send for booklet giving illustrations and descriptions.

The A. H. Nilson Machine Company, Bridgeport, Conn.

450 Rods per hour

Each 14 Feet Long ¼" Diameter Wire



¼" Size

from each of three machines, is the report of one user of Shuster Automatic Wire Straightening and Cutting Machines, AND ONE OPERATOR TAKES CARE OF ALL THREE.

The wire is perfectly straight, and each length is a duplicate of the preceding one.

To maintain this is easy for Shuster Machines, because they are built for SERVICE.

Tell us what diameters and lengths you use, and we will show you how quickly you can cut it.

Catalogue 5.

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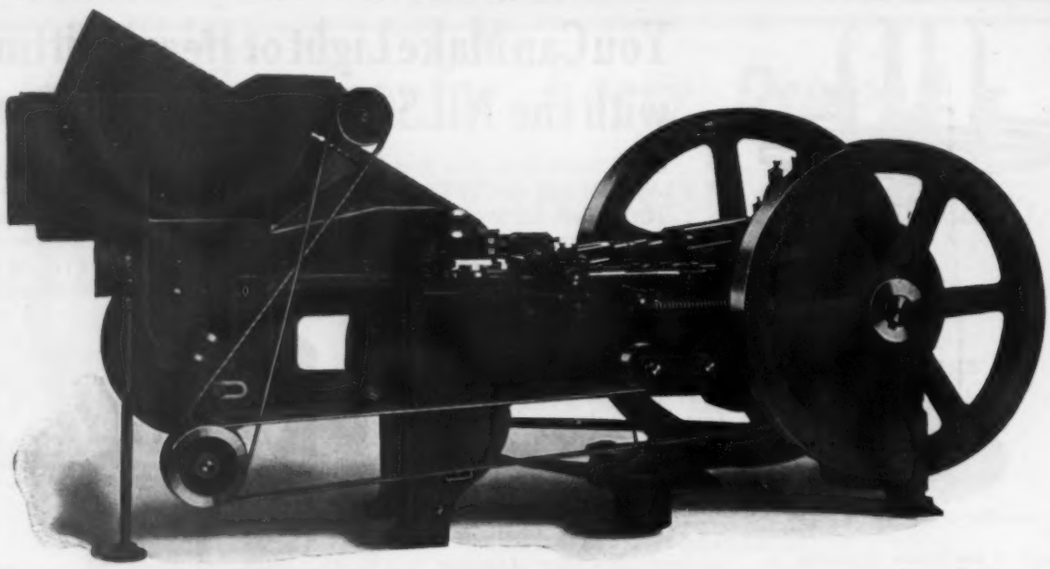
Formerly John Adt & Son *Established 1866*

STRAIGHTENER SPECIALISTS



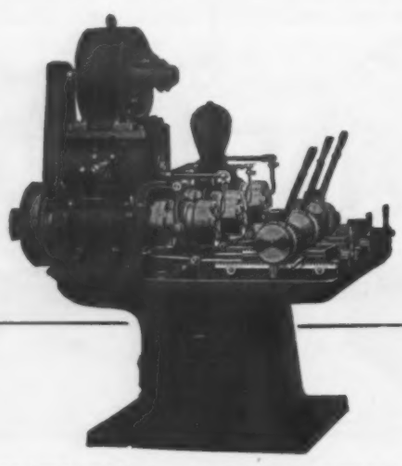
MANVILLE No. 5 C AUTOMATIC BOLT HEAD TRIMMER

You can't afford to trim bolt blanks on an ordinary punch press. It's too slow and dangerous for the operator.

Use one of the Manville new line of high speed automatic bolt head trimmers for doing this work. In a short time it will pay for several punch presses and save maiming your operators. The above machine will trim automatically the heads of cold forged bolt blanks hex, square or round up to ¾" diameter by 7" long or the flash from the heads of hot pressed blanks 1" diameter by 5" long at the rate of 60 blanks per minute.

Write today for Bulletin No. 20C

THE E. J. MANVILLE MACHINE COMPANY AT WATERBURY, CONN., U. S. A.
WESTERN OFFICE—1209 SWETLAND BLDG., CLEVELAND, OHIO



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"Always Cut Accurate Threads"

Do not require skilled labor.
Dies can be changed or adjusted in a minute's time.
Die Head has a positive lock, hence insures uniform diameter and accurate thread, regardless of stock variations.
The National interchangeable Case Die insures 30% to 50% less upkeep cost.
Thousands of satisfied users will attest the National has no equal.
Don't buy a Bolt Cutter without thorough investigation of the National.
Built in 22 different sizes and styles.

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BOLT AND PIPE THREADING MACHINERY

Let our Engineering Department solve your threading problems.

Send your specifications today

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COOK CAP SCREW MACHINES
for shaving CAP SCREWS under and over the head in one operation.

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for making IRON AND BRASS WOOD SCREWS

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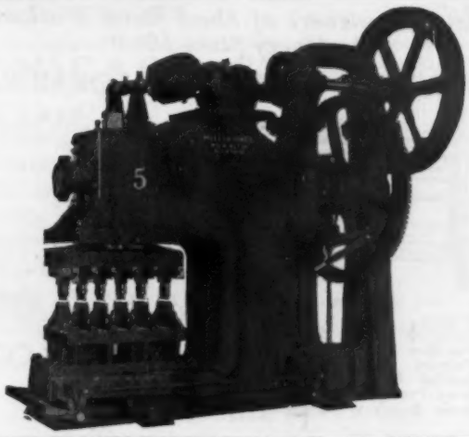

Special Plate & Structural Punches

With a variety of attachments for all kinds of BRIDGE SHOP WORK.

Tell us your needs. We can supply the machine.

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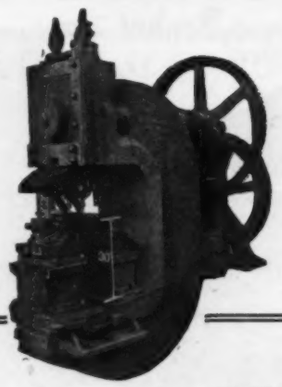
HILLES & JONES WORKS



STANDARD OPEN SIDE PUNCH

THOMAS Open Side Punches are made in variety of sizes and types for punching angles, beams and plates in combination with, and without spacing tables. The punch illustrated is arranged for punching a 30" I-beam—a highly efficient arrangement for work of this kind.

Punches and Shears
Multiple Punches
Gate Shears
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Angle Bending Machines
Spacing Tables

THOMAS SPACING MACHINE CO.
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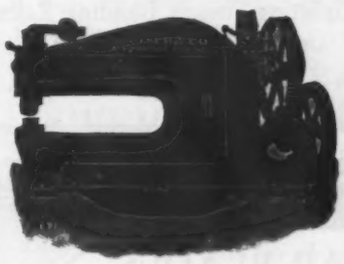
PUNCH



This cut shows one of our 72" throat Punches, with a full floating punch, and an electric solenoid controlled clutch operated by means of an electric push button.

We have had forty years' experience designing and building Punches, Shears, Rolls and Presses; all sizes up to 150 tons in weight.

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Let us quote on your present needs

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PORTABLE CRANES

Multiple Punching Machines
Plate Shearing Machines
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Original Designers of Sheet Metal Workers' Machinery Since 1863

IMPROVED SLIP ROLL FORMERS

For hand or belt power. Double back-geared—two speed. Steel rolls with shrouded gears. All bearings bored from solid—no babbitt used.

All gears keyed to shafts. Strong, durable and accurate.

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Squaring Shears
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Drop Presses
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Throatless Shears
Single & Double Bevel Shears
Splitting Shears, Bending Rolls
All types of Circle Shear Blades

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Milwaukee ALL STEEL Shears will *outcut* and *outlast* any other alligator shear. They are made by BUILDERS OF ALLIGATOR SHEARS ONLY—FOR 30 YEARS.

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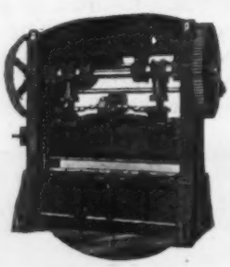

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If you are operating a Sheet Mill—Plate or Sheet Metal Shop—where you have need for ACCURATE Shearing, our G and G.H. Type Gang Slitters should be in your plant. Large production and accurate slitting are obtained by using these Slitters.

They Slit and Level Simultaneously.

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Bend and Form Your Sheets and Plates on These Labor Saving Machines

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Made from 3 to 26 feet long to bend from light sheets to ¼ inch steel plate, hand and power.

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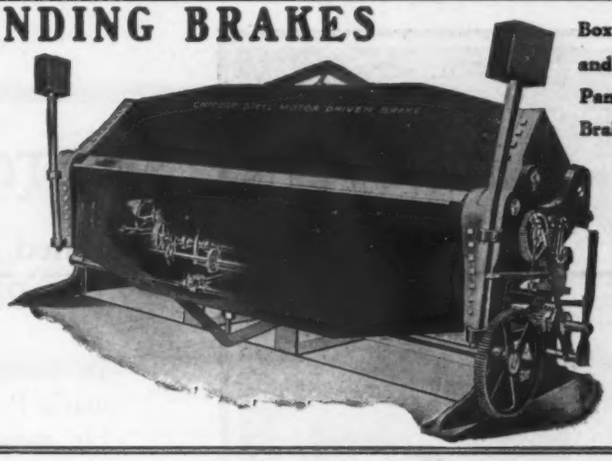

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Punching Presses

Are adapted for blank-cutting, perforating, punching, bending and forming operations on hardware, locks, sewing machines and other articles made of sheet metal. Special feeds, tie rods, safety clutches, etc., furnished to order.

They are "Built Right"

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A new and improved
BLANK HOLDER
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It holds the blank positively and evenly during the entire work stroke.

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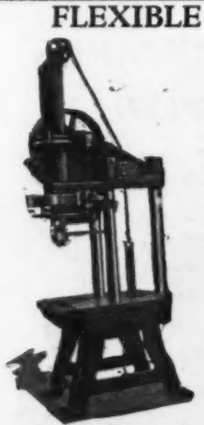
FLEXIBLE POWER PRESSES

Work Quickly



20 Ton Press

Flexible Power Presses are quick acting yet easily controlled. A slight foot pressure gives a slight ram pressure and so on up to the press capacity. This flexibility speeds up bending and straightening operations.

3, 8, 20 *ton sizes.*

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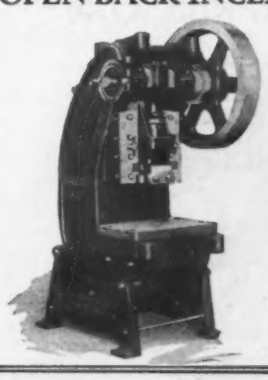

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DEPENDABLE
POWERFUL
ECONOMICAL
DURABLE

Satisfaction Assured.
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AUTOMATIC THREADING MACHINES

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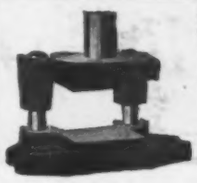

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Immediate shipments from stock

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Presses, Dies, Sub-Presses

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FEEDS TO FIT
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PUNCH PRESSES

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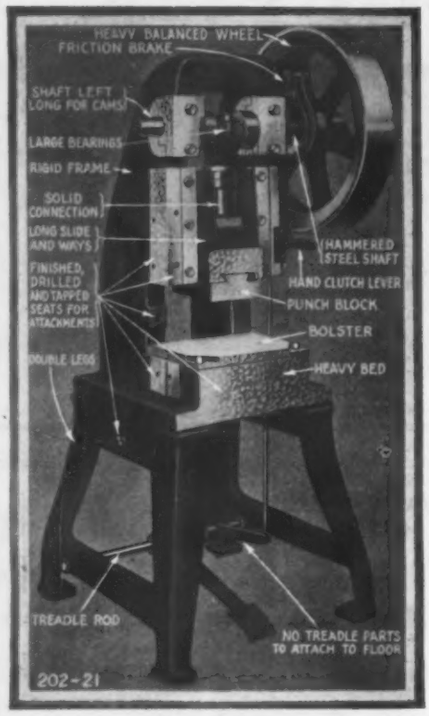

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Designed and Built for Peak Punch Press Production

In design and construction Baird Automatic Power Presses are the best that capable men and excellent machine facilities can produce. Each press is fitted and adjusted to a nicety that makes them fast, accurate and economical to use.

When you want peak production from punch presses use "Bairds".

"Ask BAIRD About It"

AUTOMATIC BAIRD MACHINE CO. BRIDGEPORT, CONN. MACHINERY

THE BAIRD MACHINE COMPANY

BRIDGEPORT, CONN.

AIR EJECTION without an AIR COMPRESSOR

Work Ejecting Compressor Attached to Punch Press.

You don't need a big troublesome air compressor when you use a "Logan" Work Ejector Attachment on your punch presses.

It blows the work into chutes or tote boxes and cleans dirt and scale out of the dies. It will pay its way in a short time.

Send for catalog R-22 which also describes our general line of air operated labor-saving devices.

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Logansport, Indiana

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SAFETY and SPEED

The Guard sweeps the entire length of the Bolster Plate on half of the downward stroke of the Punch. This means that both hands of the operator are protected—

That's Safety

Attached in One Hour
30-Day Free Trial

The Guard returns beyond the center of the Ram, on half of the upward stroke. This allows the operator to feed fast—

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No adjustments when changing dies.

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SPECIAL MACHINERY

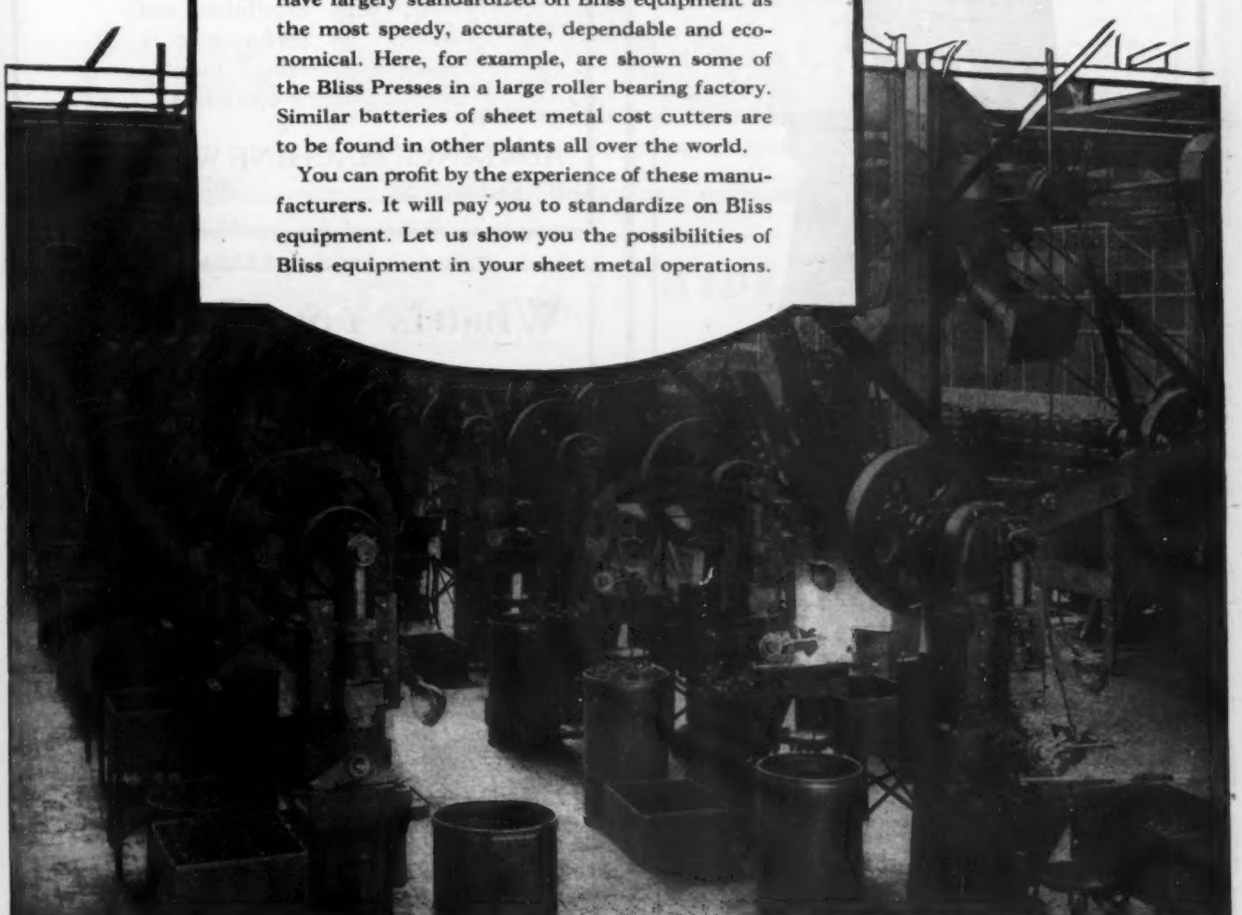
A Bliss Battery of Cost Cutters

Manufacturers whose product is entirely or principally made of sheet metal have had to make exhaustive tests to determine the most economical process of manufacture. These manufacturers have largely standardized on Bliss equipment as the most speedy, accurate, dependable and economical. Here, for example, are shown some of the Bliss Presses in a large roller bearing factory. Similar batteries of sheet metal cost cutters are to be found in other plants all over the world.

You can profit by the experience of these manufacturers. It will pay you to standardize on Bliss equipment. Let us show you the possibilities of Bliss equipment in your sheet metal operations.

BLISS

"Bliss" on your machinery is more than a name; it's a guarantee.



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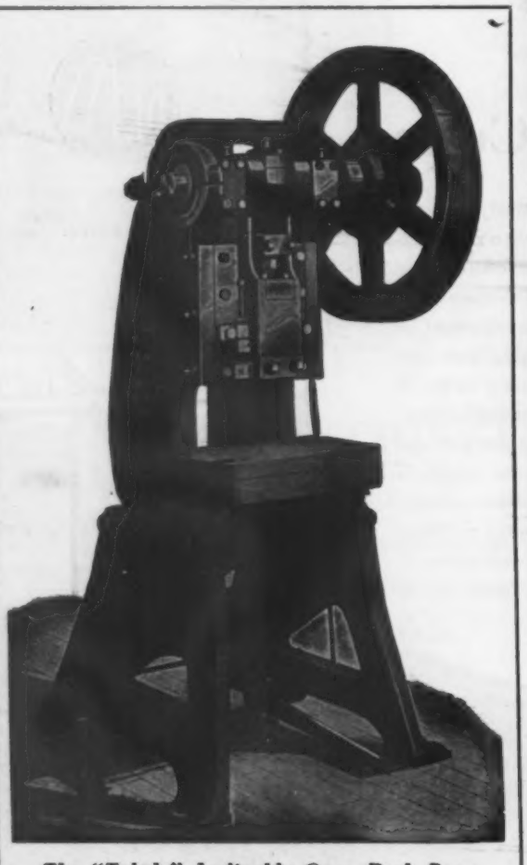
No. 536

THE
"TOLEDO"
INCLINABLE
OPEN BACK
PRESSES



The "Toledo" Inclinable Open Back Press No. 3

The "Toledo" Inclinable Open Back Presses are built with or without gearing and have been in use for more than thirty years, and are unsurpassed for their wide range of usefulness and durability. They are adapted for a great variety of work, including nearly every kind of blank cutting, forming, perforating, drawing, shaping and combination die work, covering a large proportion of the operations required in the manufacture of tin cans, pieced and stamped ware, petroleum cans, powder kegs, lamp and lantern trimmings, electric and brass goods, armature discs and segments, bicycle parts, locks, silverware, spoons, stove and trunk trimmings, automobile parts, and many other articles too numerous to mention here.

Excellent facilities for all kinds of high grade machinery. Forging and gear cutting a specialty.

Engineers, Founders and Machinists on Equipment for Sheet Metal Products.

"PRESSES FOR EVERY PURPOSE"

Estimates furnished. Correspondence Solicited.

THE TOLEDO MACHINE & TOOL CO.

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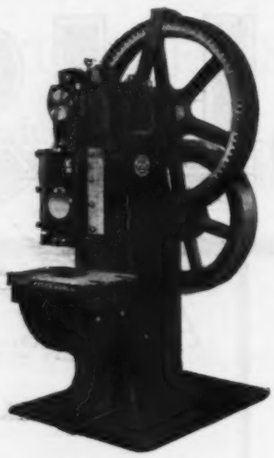
THE TOLEDO

"ADRIANCE"



POWER PUNCHING PRESSES

Sturdy tie-rod construction assures long life for press and tools, with expedition and accuracy of performance in punching, bending, forming and perforating operations.

ADRIANCE MACHINE WORKS, Inc.
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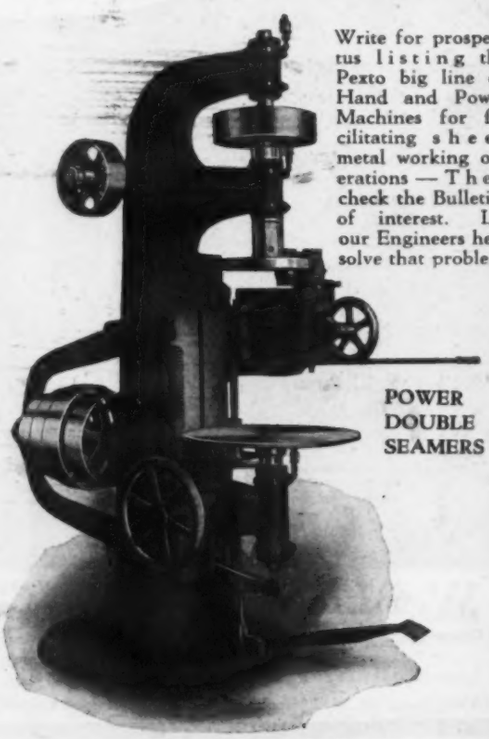
What Is Your Problem?



Write for prospectus listing the Pexto big line of Hand and Power Machines for facilitating sheet metal working operations — Then check the Bulletins of interest. Let our Engineers help solve that problem.

POWER DOUBLE SEAMERS

Dies a Specialty

THE PECK, STOW & WILCOX CO.
SOUTHINGTON, CONN., U. S. A.

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HYDRAULIC and POWER TOOLS

For Boiler, Forging and
Sheet Metal Working Shops

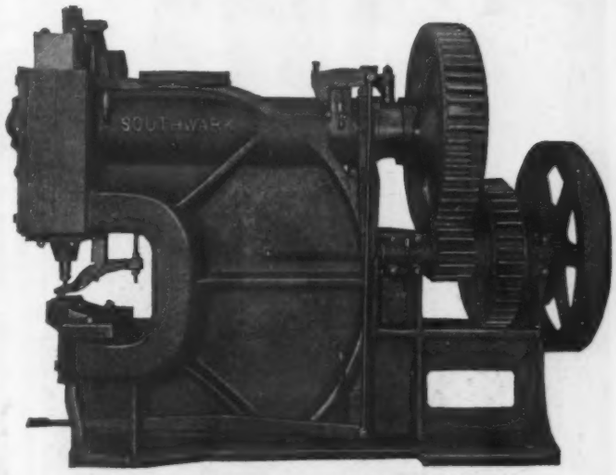
Hydraulic Presses for Every Use

Machinery for Chemical Plants, Fertilizer
Factories, Abattoirs,
Rubber Manufacturing Plants, Paper Mills, Etc.

Special Tools Designed and
Built to Suit Any Requirements

Standard Equipment
In Stock Ready for Immediate Shipment

Established in 1836
NINETY YEARS
of
ENGINEERING EXPERIENCE



NO. 8 SOUTHWARK POWER PUNCH—CAPACITY 2" THROUGH 2" OR EQUIVALENT

CHICAGO, ILL.
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SOUTHWARK
FOUNDRY AND MACHINE CO.
ESTABLISHED 1836
PHILADELPHIA, PA.

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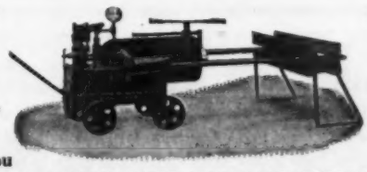
400 WASHINGTON AVENUE, PHILADELPHIA, PA.

LAFF IT OFF! ELMES HYDRAULIC PRESSES SINCE 1851 LAFF IT ON!

If You Use an Elmes Forcing Press You'll Laugh Off and On

EVERY TIME
A Break Down Comes

EVERY TIME
Others Bring Their Forcing Work to You



EVERY TIME
You Rent Your Forcing Press to Others

FORCING PRESS SALES 1925—100% INCREASE

CHARLES F. ELMES ENGINEERING WORKS
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ENTIRELY SELF-CONTAINED

Require small space—no separate pumping equipment or accumulator. Provide precise smooth control—rapid advance and return of ram. Reduce cost of straightening, forcing, assembling, broaching. Ask for Bulletin 30.

THE OILGEAR COMPANY
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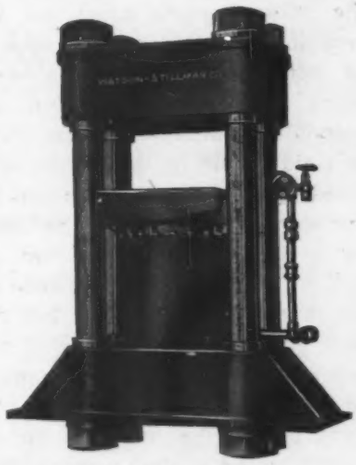
FRENCH HYDRAULIC MACHINERY
PIQUA OHIO

HYDRAULIC MACHINERY



1800 Ton Hydraulic Die Press

We are equipped to handle orders for hydraulic machinery in all its many branches—valves, pumps, accumulators, presses, benders, shears, shaft straighteners, etc.

Our large line probably offers a standard model that will meet your requirements. If not, our experience of over 75 years building hydraulic machinery is yours for the asking.

Write for Catalogs

THE WATSON-STILLMAN CO.
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Chicago—Cleveland
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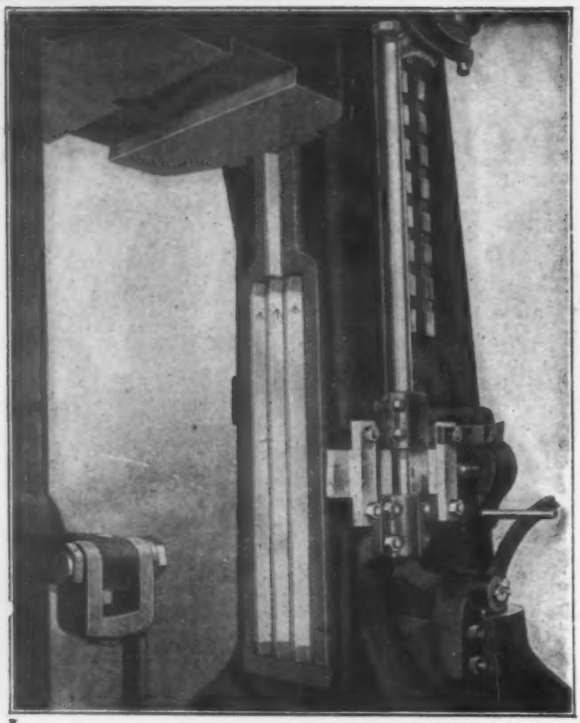

DROP FORGERS have been quick to recognize the advantages of the Erie inserted guide construction for board drop hammers. Since this design was introduced, the majority of our board drop sales have been of hammers with box section frames and inserted guides.

The inserted guide has triple V's providing greatly increased area at the bottom, where all the wear occurs. The renewable sections are reversible and interchangeable. They are rigidly held in the frame, supported on five sides. They can be removed and replaced in the hammer in half an hour, and can be trued up on the smallest planer in your shop. This isn't a job that the repair gang dodges, because of the work involved, or that the production man postpones, because it means taking the hammer out of production for a week. With this construction, your hammers will always be kept in shape to do the most accurate work.

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ERIE FOUNDRY COMPANY

Forge Shop Equipment

Sheet Galvanizing Machinery

ERIE, PENNA., U. S. A.

"A good place in which to live, to work, and to play."

Hydraulic Machinery
Automatic Gas Producers

R. D. WOOD & CO.
ESTABLISHED 1803
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(See first issue each month for *Special Announcement.*)

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Engineer - - Builders of
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TWENTY EAST BROAD, COLUMBUS, OHIO
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FORGING HAMMERS

Steam or Air Operated

Best on market for general forging. In use for 50 years in Railroad Shops, Shipyards, Mechanical Depts., Forge Shops, etc.

Manufactured by

R. STEEL & SONS,
Inc.
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If it's a NAZEL AIR HAMMER

you are not limited to the size stock it will work efficiently, as no injury can be done to it by working larger pieces than it is recommended for. The NAZEL HAMMER has a greater capacity in relation to ram weight than either the steam or ordinary power hammer, due to its long stroke and powerful non-bounding, squeezing blow, resulting in more forgings with fewer reheats.

Write for the NAZEL HAMMER BOOK; it's free.

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Also builders of THE DILL SLOTTER. Adds a complete Department. Write for booklet "The Dill Slotter in Action."

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Steam, Steam Drop and Board Drop Hammers
Trimming Presses Punches and Shears
Hydraulic Machinery All Types and Sizes
Presses, Riveters, Pumps and Accumulators
Special Machinery

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BLACKER HAMMERS

"Now the Hand Anvil —is Worked by Machine"
Write for our Folder on Modern Blacksmithing
BLACKER ENGINEERING CO.
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LITTLE GIANT POWER HAMMERS

For Smithing and Forging.
Little Giant Wood Lathes for Pattern Making.
Little Giant Band Saws for Pattern Making.

LITTLE GIANT COMPANY, Mankato, Minn.
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Look through the window

with us into shops here and there and see for yourself what

BRADLEY HAMMERS

are doing for others. See our full page ad. first issue of each month.

C. C. BRADLEY & SON, Inc., Syracuse, N. Y.
Established 1832

Morgan Construction Company

Rolling Mills Producer Gas Machines
Wire Mills Reversing Valves

(See first issue each month for *Special Announcement*)

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UNION STEEL CASTING CO.

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ANNEALING BOXES & BOTTOMS
ACID OPEN HEARTH
STEEL CASTINGS

"STANDARD"

Well Made Products Include

Seamless Tube Mills · Lap and Butt Welded Pipe Mills · Bar and Sheet Mills · Cold Drawing Machinery Shears · Roll Lathes · Sand and Chilled Iron Rolls · Iron Castings, etc.

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Rolling Machines for Forming Moldings, Door Bucks, Steel Trim, Hollow Metal Windows, Corner Beads, etc.

Gang Slitters—Long Forming & Cutting Dies

Rolls Air Furnace
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CHILLED **ROLLS** SAND

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HYDE PARK - - - PA.

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WILLIAMS, WHITE & CO.

MOLINE, ILLINOIS, U. S. A.

ANGLE BENDING ROLLS	FORGING ROLLS
BULLDOZERS	MULTIPLE PUNCHES
DROP HAMMERS	PUNCHES & SHEARS
EYE BENDERS	PLATE SHEARS
FORGING PRESSES	TIE ROD PRESSES
FORGING HAMMERS	UPSETTERS

OSTERHOLM SURFACE GRINDER
SPECIAL MACHINERY

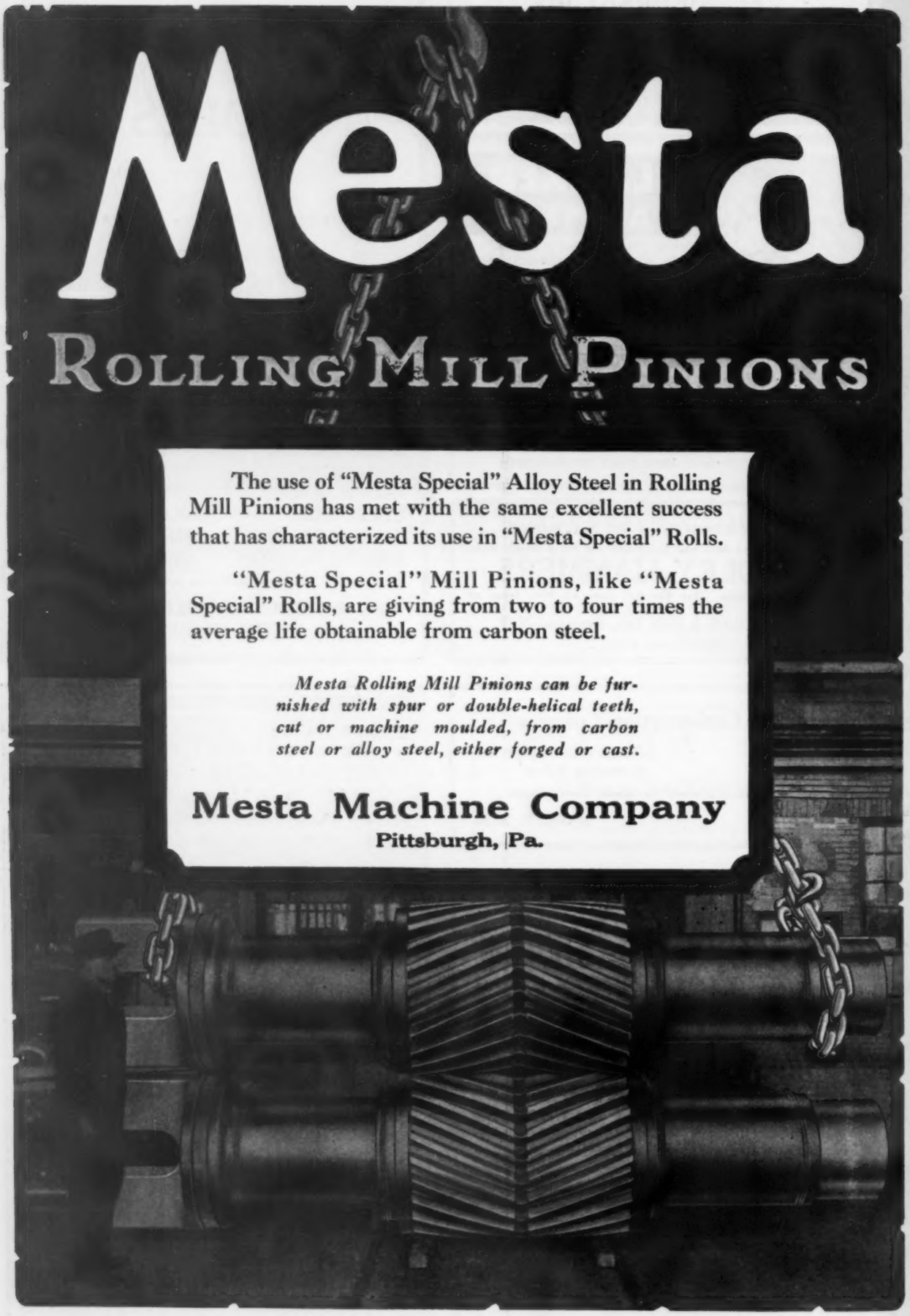
PITTSBURGH ROLLS CORPORATION

PHOENIX SAND ROLLS

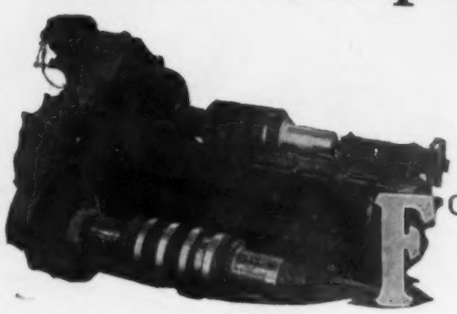
PHOENIX CHILL ROLLS

PHOENIX STEEL ROLLS

PHOENIX METAL ROLLS


Mesta
ROLLING MILL PINIONS
The use of "Mesta Special" Alloy Steel in Rolling Mill Pinions has met with the same excellent success that has characterized its use in "Mesta Special" Rolls.
"Mesta Special" Mill Pinions, like "Mesta Special" Rolls, are giving from two to four times the average life obtainable from carbon steel.
Mesta Rolling Mill Pinions can be furnished with spur or double-helical teeth, cut or machine moulded, from carbon steel or alloy steel, either forged or cast.
Mesta Machine Company
Pittsburgh, Pa.

How A Well-Known Steel Company Eliminated Roll Breakage



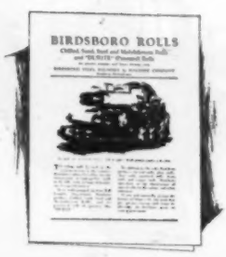
FOR large hand rounds on guide and bar mills, a prominent steel company formerly used Chilled Rolls.

Because of the unusual depth of chill required for this service, rolls failed frequently, and the general service of the rolls was unsatisfactory.

Birdsboro "DURITE" Rolls were substituted for the job. Roll breakage was stopped. Service reports were highly complimentary to Birdsboro, and practically all chilled rolls were replaced with Birdsboro "DURITE" Rolls.

Get Birdsboro dependability in your rolls, and the greater tonnages and lower turning costs that Birdsboro Roll users experience.

Let Birdsboro quote you on your roll requirements.



Birdsboro Rolls, that produce greater tonnages and lower turning costs, are described in this bulletin. Write for a copy.

BIRDSBORO

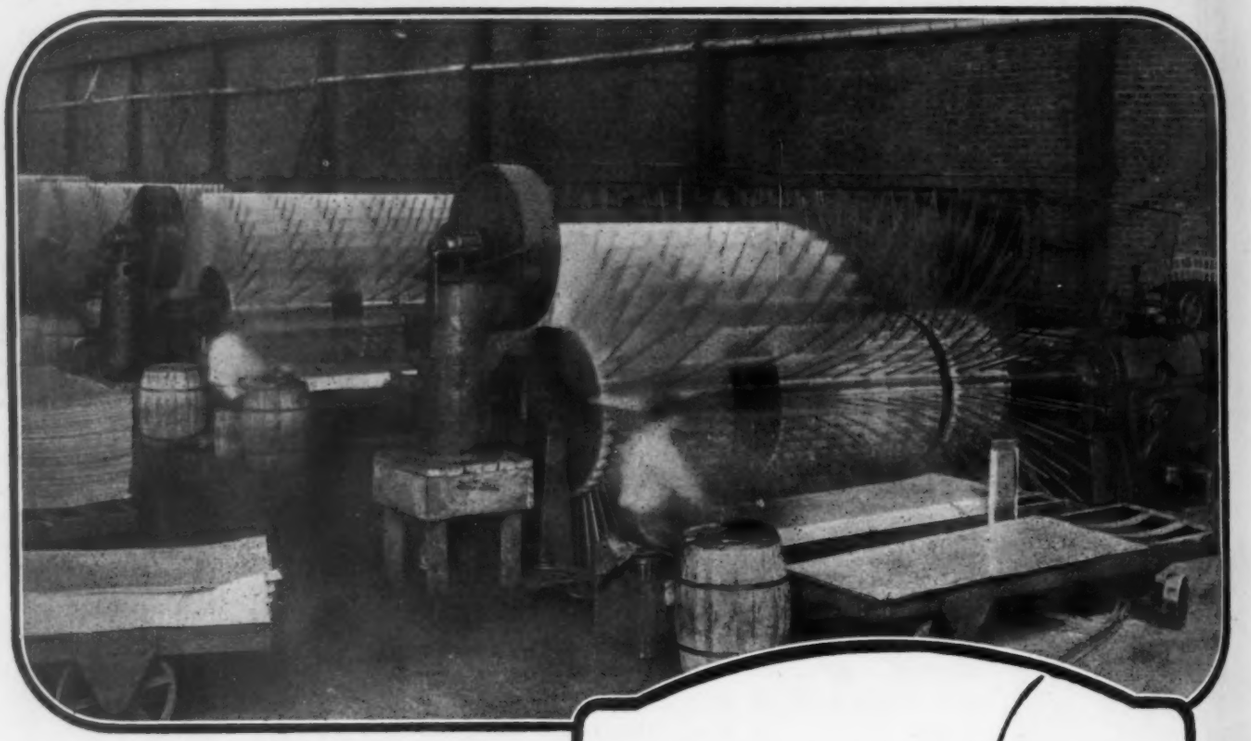
STEEL FOUNDRY AND MACHINE COMPANY

DESIGNERS AND BUILDERS

of hydraulic presses and equipment for boiler, structural and railroad shops, shipyards, rubber mills, linoleum plants, asbestos mills and other industries requiring hydraulic equipment. Hydraulic Operating Valves. Special Machinery. Rolling Mills. Rolling Mill Machinery. Steel and Iron Castings. Rolls: "Durite", Steel, Chilled and Sand. Railroad Castings. Bolsters. Side Frames. Forging Ingots. Crushing and Concentrating Machinery. Jackson Belt Lacers.

BIRDSBORO, PENNSYLVANIA

SHEET GALVANIZING EQUIPMENT



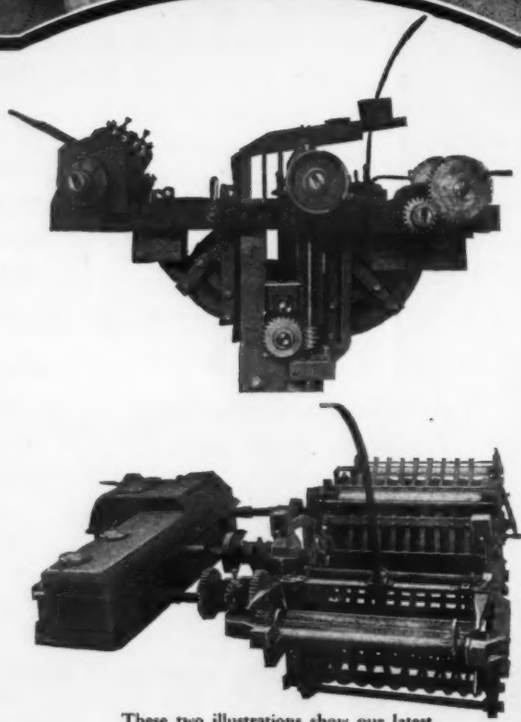
Cooling Wheels and Leveling Machines

A CASUAL OBSERVER might say that all the operations of sheet galvanizing are simple and rough which can be worked out by any engineer, but when it is considered that a large tonnage of sheets, of a quality that will meet present-day exacting standards, must be turned out continuously at the lowest possible cost, we see that the entire equipment is a matter of careful study and development.

We have always kept in close touch with the operation of our equipment, and developed and improved it from time to time as experience showed where it could be improved. "United" is in position to give you the benefit of valuable experience.

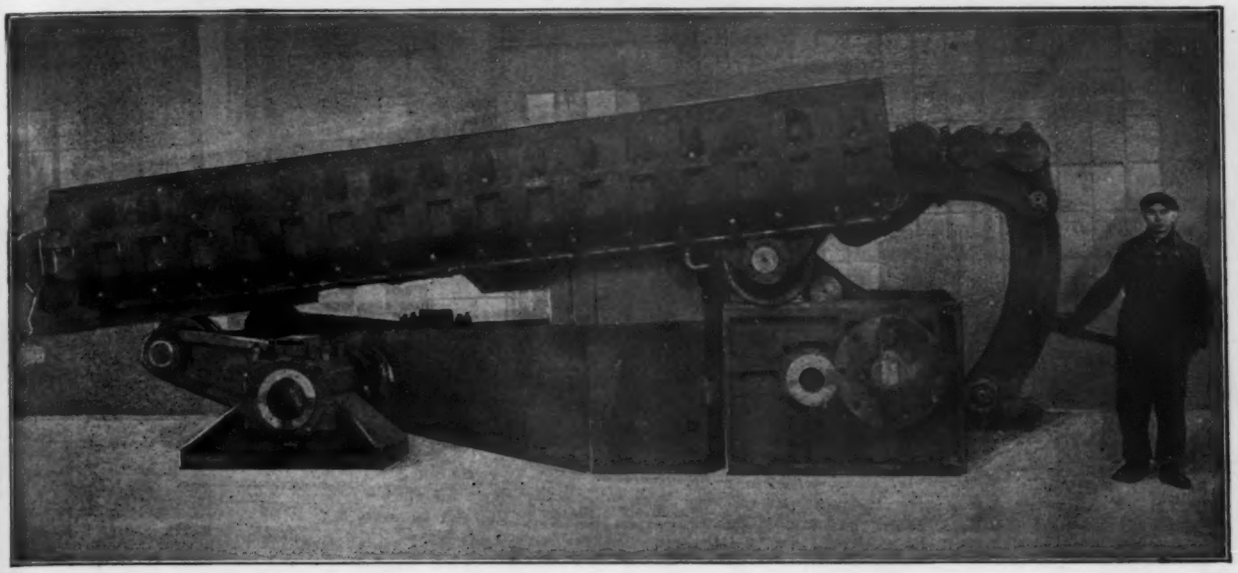
Bulletin "O" covers United Galvanizing Equipment

UNITED ENGINEERING & FOUNDRY COMPANY
PITTSBURGH, PA.



These two illustrations show our latest type, patented, galvanizing machines.

"UNITED"



WHEELING

Shear Depressing Table

Blooming Mills
Sheet & Tin Mills
Mill Tables
Merchant Mills
Bar Mills
Shears
Roll Lathes

WHEELING QUALITY
STEEL ROLLS
SUPER-STEEL ROLLS
CHILLED ROLLS
SAND ROLLS

Mo-lyb-den-um
ROLLS

STEEL AND IRON CASTINGS
ROLLING MILL MACHINERY
SPECIAL MACHINERY

Wheeling Mold & Foundry Co.
Wheeling, W. Va.

CARBON AND ALLOY STEEL ROLLS AIR FURNACE IRON AND STEEL CASTINGS SAND AND CHILLED IRON ROLLS

PHILADELPHIA ROLL & MACHINE CO.
52ND ST. & GRAYS AVE., PHILADELPHIA, PA.
ROLLING MILL MACHINERY
SUBSIDIARY OF TAYLOR-WHARTON IRON & STEEL CO.

LEWIS

Rolling Mill Equipment
Chill Rolls
Roll Lathes
Gears and Gear Reduction Units

LEWIS FOUNDRY & MACHINE CO.
PITTSBURGH, PA., U. S. A.

There's More Money in Crushed Turnings

The American Chip Crusher will reduce yours so economically, and bring about such savings in oil, labor, space and shipping costs, that it will pay for itself in a few months.

Write us for full particulars.

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WICKES BROS.
320 Water St., Saginaw, Mich.
1856 1926
New York Office—501 Fifth Avenue. Seattle Office—736 White-Henry Bldg. Builders of: Heavy Duty Plate & Structural Tools, Heavy Duty Engine Lathes, Special Production Lathes, Crankshaft Turning Equipment, Blue Print Machines.

Make Your Chips Yield a Bigger Return

The American Ring Steel Turnings Crusher will crush chips at a cost low enough to show a good profit when compared with the increased selling price of crushed chips.

Write for information.

American Pulverizer Co., St. Louis, Mo.

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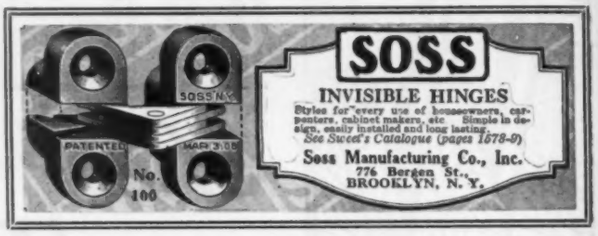
... protection against fire, theft, and the elements. The perfect steel rolling door and shutter for all industrial buildings. Illustrated catalog on request. Write for details.

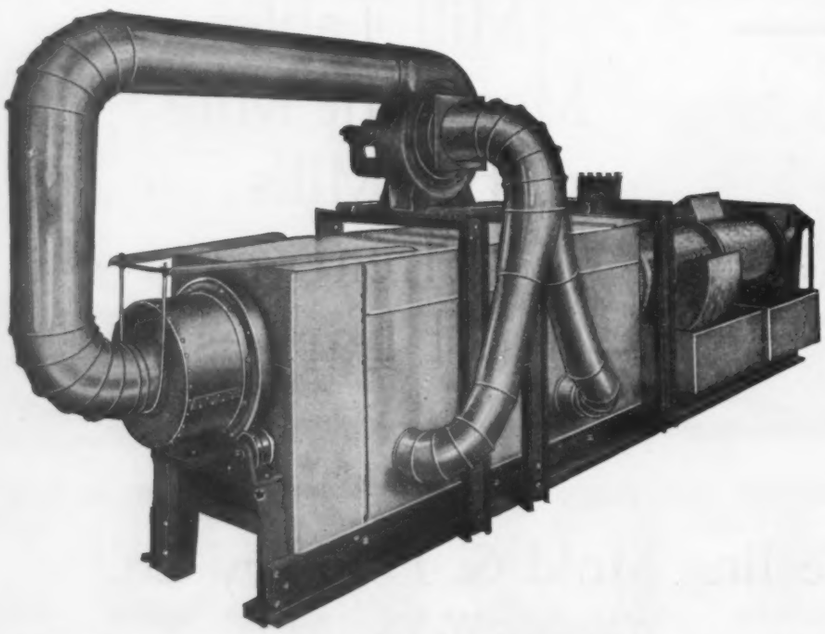
The Kinnear Mfg. Company
817-867 Field Ave. Columbus, Ohio


SOSS
INVISIBLE HINGES
Styles for every use of housewners, carpenters, cabinet makers, etc. Simple in design, easily installed and long lasting.
See Sweet's Catalogue (pages 1678-9)
Soss Manufacturing Co., Inc.
276 Bergen St.,
BROOKLYN, N. Y.
SOSS N.Y.
PATENTED
No. 100

For a Better Finish on Your Metal Parts Use the

NO-DUST

WASHING-RINSING and DRYING MACHINE

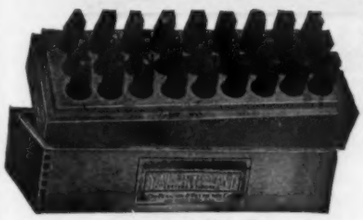


This machine effectually removes cutting oils or compounds from your products; it then washes and dries them. Just dump the pieces in the hopper and remove them at the other end. They'll come out clean and bright.

May We Send Further Details?

NO-DUST DRYING MACHINE COMPANY, WATERBURY, CONN.

YALE HAND CUT STEEL BRAND LETTERS & FIGURES



YALE BRAND LETTERS AND FIGURES give sharper impressions—because hand cut.

They last longer because we use high grade tool steel tempered by our own special process.

All sizes from 1/64-in. to 1-in.

Showing handy set of Yale Brand Steel *Hand cut* figures.

Write

THE HOGGSON & PETTIS MFG. CO.
New Haven, Conn.

Steel Stamps
HAND CUT
STEEL LETTERS and FIGURES
STENCILS-BURNING BRANDS
TOOL CHECKS
SEALS,
SEND FOR CATALOG
THE SCHWERDTLE STAMP CO.
ESTABLISHED 1879
39-45 CANNON ST. BRIDGEPORT, CONN.

Nukem Window Cleaner

Nukem

Removes the heaviest grease and carbon dirt. A liquid containing no acid. Easy to apply. Economical. Write for trial offer.

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WON'T REMOVE PAINT
Skybryte CLEANER (LIQUID)
The National Glass Cleaner
The SKYBRYTE Co., Keith Bldg., Cleveland, O.
Chicago Branch: 435 No. Michigan Ave.

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WICKES
Vertical Water Tube
Horizontal Water Tube (Cross Drum)
Marine Water Tube
Horizontal Return Tubular

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120-130 Carroll St., Saginaw, Mich., U. S. A.

Vertical Type A.S.M.E. Code Boilers
Crane, Shovel, Hoisting Engine, Stationary
Riveted Steel Plate Tanks
Hamburg Boiler Works, Inc.
Hamburg, Berks County, Pa.

There is no more

profitable way for a man to invest his time than to read the journal of his chosen field.

The Babcock & Wilcox Co.
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ESTABLISHED 1868

THE BABCOCK & WILCOX COMPANY STEAM

Water Tube Boilers
Steam Superheaters
Chain Grate Stokers

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PENNSYLVANIA
"None Better Built"

AIR COMPRESSORS
CENTRIFUGAL PUMPS
VACUUM PUMPS
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Main Office and Works: Easton, Pa.
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A TYPE FOR EVERY SERVICE
Bulletins on request

GOULDS PUMPS, INC.
SENECA FALLS, N. Y.
PUMPS

MYERS HANDY BILLY PUMPS

For Heavy Duty

Meet U. S. Navy requirements as to construction, capacity and operation. Designed for service on ships, in mills, mines and factories, etc. Three sizes — 4, 5 and 6" cylinders, single or double levers and pistons, operation by one, two or four men. Write for catalog showing this and many other styles of pumps.

The F. E. MYERS & BRO. CO., Ashland, Ohio

Deming

Deming Power Pumps comprise a complete line of pumping equipment designed for every requirement. Figure 1062 [illustrated here] is an *Automatically Oiled* Deep Well Pump of exceptional merit. Send for Bulletin featuring Figure 1062 Complete Catalog on request.

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Established 1880 Salem, Ohio

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Frederick Centrifugal Pumps

ALL TYPES FOR ALL PURPOSES

DOUBLE SUCTION TYPE—EQUIPPED WITH PATENTED ADJUSTABLE WEARING RINGS

ORIGINAL EFFICIENCY MAINTAINED, —POWER CONSUMPTION CUT,— REPAIR BILLS REDUCED

IT WILL PAY YOU TO INVESTIGATE

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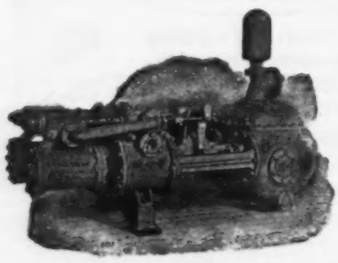
FLEXIBLE SHAFT COUPLINGS



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Since 1864 we have been building Centrifugal Pumps, Hydraulic Dredges and Steam Engines. You can depend on all Morris equipment.

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Reciprocating steam and power pumps for general service, boiler feeding, pipe line and oil country service.

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Widely used in Every Industry

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ALL SIZES, ALL TYPES, ALL PRESSURES TO MEET ANY ENGINEERING REQUIREMENTS

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for every heating service
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GENUINE SCOTCH **GAUGE GLASSES**
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"Perth Brand" for pressures up to 200 lbs.
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A POWELL VALVE

Fig. 102 Bronze White Star Valve

For Every Purpose

Bronze, Iron, and Steel Valves, lubricators, oilers, grease cups. A complete line of engineering appliances.

The Wm. Powell Company
Cincinnati, Ohio

18 WORTHINGTON COMPRESSORS

in the six plants of The Illinois Glass Company

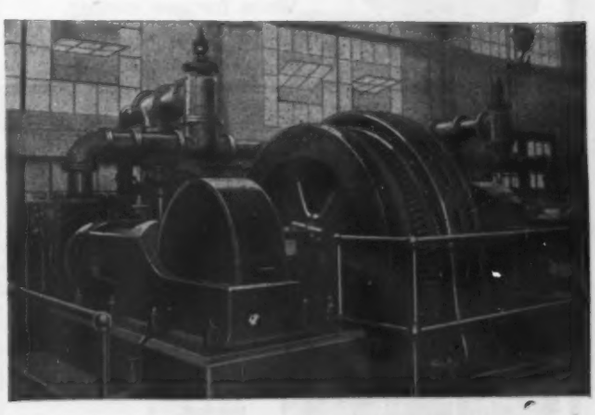
The Illinois Glass Company maintains factories at Alton, Illinois; Gas City, Indiana; at Bridgeton, Millville and Vineland, New Jersey, and a subsidiary plant at Klondyke, Missouri.

In 1916 this company purchased its first Worthington FEATHER (Reg. U. S. Pat. Off.) Air Compressors and Vacuum Pumps. The excellent performance of the first units, one of which is still in service, led to the purchase of 17 additional Worthington FEATHER Valve Compressors and Vacuum Pumps from time to time. Each new unit lived up to the standards of performance and of satisfactory service set by the first.

In 1923 a Worthington Axiflo (Reg. U. S. Pat Off.) deep-well pump was purchased for the Gas City, Ind., plant. The excellent performance of this pump led to the purchase of two others, one for use in the Alton, Ill., plant and the other for use in the Millville, N. J., plant.

Where one Worthington product goes, others usually follow. It is the natural consequence of the inbuilt trustworthiness of all products bearing the name Worthington.

Compressors	Oil and Water Meters
Pumps	Condensers
Oil and Gas Engines	Feedwater Heaters



One of two Worthington 27-in. by 24-in. horizontal duplex direct-connected FEATHER Valve Air Compressors with five-step variable capacity control in Alton, Ill., plant of the Illinois Glass Company. Each compressor is driven by a 650-hp., 164-r.p.m. synchronous motor and has a capacity of 5000 cu. ft. per min. against 45 lb. per sq. in. pressure.

7662-3

WORTHINGTON PUMP AND MACHINERY CORPORATION
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LAKE ERIE MACHINERY

An Operating Value You Can Depend Upon

You can depend upon our operating valves to function satisfactorily for the simple reason that we are specialists in hydraulic engineering and in the building of equipment for same. This photograph shows a forged steel body, spindle type operating valve. We make it in 3 way or 4 way types for pressures up to 6000 pounds.

"Lake Erie" machinery is dependable. Let us have your requirements.

LAKE ERIE PRODUCTS

Hydraulic Presses and Accumulators
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MIF

Malleable Iron and Steel Pipe Fittings and Castings
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Foundry Accessories

See Our Page Facing Reading, September 16th Issue

MALLEABLE IRON FITTINGS CO.
BRANFORD, CONN.

NAUGATUCK SEAMLESS

COPPER BALL FLOATS
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FELTS for every conceivable purpose—
Washers, Gaskets, Wicks, Pads, Strips, for lubricating, dustproofing, insulating, etc.

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OF EVERY DESCRIPTION.
TRADE A MARK ATWOOD
PITTSBURGH VALVE FOUNDRY & CONSTRUCTION CO.
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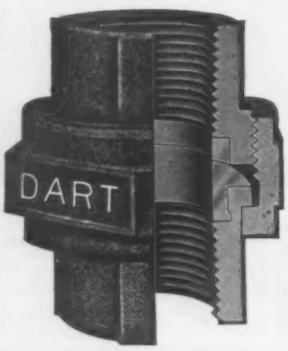
ENGINEERS—FOUNDERS—PIPE-FITTERS & MACHINISTS.

JEFFERSON UNIONS
Made from Air-Refined Malleable Iron. Brass to Iron Joints. Accurate pipe threads.
Write for new catalog.
JEFFERSON UNION CO.
Lexington, Mass.

DART for Durability

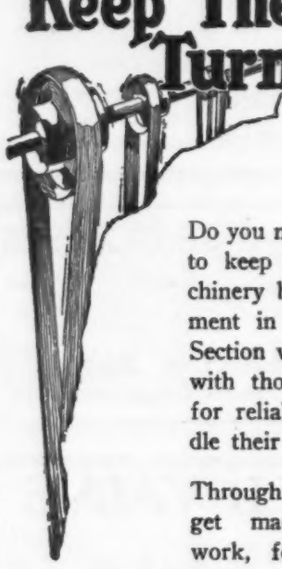


Dart Unions give years of satisfactory service. They cannot leak, rust or corrode and can be used over and over again when changes in pipe line are made.
Free samples on request.

The Fairbanks Co., Sales Agents. Canadian Factory: Dart Union Limited, Toronto

E. M. Dart Mfg. Co.
Providence R. I.

Keep The Wheels Turning



Do you need some extra work to keep your men and machinery busy? An advertisement in the Contract Work Section will put you in touch with those who are looking for reliable concerns to handle their contract work.

Through this Section you can get machine work, press work, foundry work, automatic screw machine work, etc., etc.

"Keep the wheels turning"—the cost is small.

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THE CLASSIFIED SECTIONS
of The Iron Age

150 Pounds Pressure

CRANE VALVES

2500 Pounds Pressure

Motor controlled wedge gate valve No. 493

ACTS WITH THE SURENESS OF HUMAN HANDS

Acting with the sure, firm touch of human hands, Crane motor control makes the opening or closing of a giant 48-inch wedge gate valve as easy as the handling of a valve of 1-inch size. Without necessity of any delicate adjustment, it closes a valve tightly but without injury to any moving part.

With motor control thus highly developed, valves may be operated by the push of a button, or any one of several buttons placed at convenient points. Or several valves may be controlled from one station. Those advantages are virtually indispensable for emergency valves, large valves, or valves difficult of access.

Circular No. 186 gives full description of the Crane motor control for valves. Write for it.

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of The Iron Age

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Any Tool on This List

$500

From Now Until October 15th,

When We Will Start New Construction Work at Our Jersey City Plant

18″ x 8′ Lathe—Latest type, quick change, 3 step cone, double back gears, like new.
14″ x 8′ Lathe—Same as above.
26″ x 14′ Niles-Bement-Pond Lathe—Heavy type.
26″/44″ Swing McCabe Double Spindle Lathe.
No. 22 Brainerd Milling Machine.
14″ Stroke Slotter.
18″ Gleason Bevel Gear Planer.
12″ Gould & Eberhardt Gear Cutter.
2⅞″ Bar Horizontal Boring Mill.
42″ Bullard Vertical Boring Mill.
21″ Gisholt "Gap" Turret Lathe.
2 x 24 Jones & Lamson Turret Lathe.
26″ x 6′ Niles Planer.
New 15″ Stroke Shaper.
8′ Set Bending Rolls.
1000 lb. Hammer.
Punch and Shears, 24 to 42″ throat.
30″ and 12″ Cold Saws.
Universal Grinders. **Many other tools on this list.**

On the Special $1,000 List Large Lathes, Planers, Radial Drills and New Lathes up to 21″ swing.

Also a large plant equipment containing Lathes, Planers, etc., and a complete pattern makers' shop equipment.

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"The Reliability of J. J. McCabe's Used Machinery is Known All Over the World"

LOWEST PRICES

and America's Greatest Stock

Over 30,000 posted manufacturers and alert machinery dealers make it a point to keep in close touch with our latest purchases—they never think of buying anything until our vast stocks are carefully considered.

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96"x40' Fifield Triple Grd.
48"x50' Amal. H.D. Gun Bor.
48"x44' Bridgeford H.D. Bor. Grd. Hd
54"x40' Pond Triple Geared
48"x16' Putnam H.D. Production
39"x64' Amal. Grd. Hd. Boring
36"x56' Bridgeford Grd. Hd. Bor.
36"x40' Bridgeford H.D. Boring
36"x32' Bridgeford Grd. Hd. Q.C.G.
36"x30' American Grd. Hd. Q.C.G.
36"x17' Pond Triple Geared
24"x12' American Q.C.G.
24"x 8' LeBlond Q.C.G.
21"x12' LeBlond Rapid Production
20"x10' Davis Q.C.G.

PLANERS

60"x60"x18' Pond 2-Heads
48"x48"x20' N.B. Pond 2-Heads
48"x48"x18' New Haven 1-Head
48"x48"x 8' Sellers 1-Head
36"x36"x21' Gray 2-Heads
32"x32"x 6' Gray 1-Head
30"x30"x20' Woodward & Powell 2-Heads
30"x30"x10' Cincinnati 1-Head
26"x34"x24' Whitcomb 2-Heads

SHAPERS

30" Norton
20" Smith & Mills
16" Stockbridge
16" Flather
14" Fitchburg

AIR COMPRESSORS

1750 Ft. L. D. & G. Belt Driven
800 Ft. Chgo. Pneu. Belt Driven
500 Ft. Laidlaw Belt Driven
464 Ft. Sullivan Belt Driven
350 Ft. Gardner Belt Driven
6x6 Curtis Duplex Ver. Belt Driven
1850 Ft. Sullivan Steam
1750 Ft. Chgo. Pneu. Steam
1050 Ft. Ingersoll Steam
600 Ft. Ingersoll Steam
425 Ft. Clayton Steam
60 Ft. N. Y. Air Brake Loco. Type

GENERATORS

200 K.W. Gen. Elec. 250 Volt. Compound Wound Direct Current Generator 800 amp., 200 R.P.M. complete with 1200 amp. switchboard panel direct connected to 18x21 Erie 4-valve 300 H.P. Horiz. Steam Engine.

1560 K.V.A. Westinghouse Turbo Generator 1880 amp. 480-volt 3-ph. 60-cy. with 18 K.W. D.C. Exciter Generator 125-volt 144-amp. direct connected to Westinghouse Low Pressure Steam Turbine 1800 R.P.M. with necessary ftgs.

60 K.W. Triumph Elec. Co. 125 Volt D.C. Generator 480 amp., speed 850 R.P.M.

50 K.W. Western Elec. Type OPE Alternating Current Generator, direct connected to 11x12 Chandler & Taylor Horiz. Side Crank Engine Complete with Exciter, Switchboard Panel, etc.

MILLERS

24"x24"x12' Ingersoll Horiz. Slab
No. 3 Brown & Sharpe Vertical
No. 5-C Becker Vertical
No. 5-B Becker Vertical
No. 22 Garvin Vertical
No. 7-H Becker Lincoln Type
No. 2½ Hendey Lincoln Type
No. 1½ Cincinnati Full Universal
No. 22 Garvin Vertical
Nos. 1 and 2 P. & W. Die Sinking
No. 24 Lees-Bradner Auto. Thread
No. 2-A and No. 3 Milwaukee Plain

PUNCHES and SHEARS

48" Thr. Cleveland 1" cap.
42" Whiting 1" cap. arch. jaws
36" Thr. Clev. 1" cap. arch. jaws
27" Thr. Clev. 1" cap. arch. jaws
24" Thr. Morgan D.E. cap. 5/16x24"
20" Mack-Hemphill Hyd. Bloom Shear
18" Thr. Clev. ½" cap. arch. jaws
10" Thr. Cleveland Horz. 1" cap.
No. 2 Carlin Allig. Shear cap. 5x5"
Chgo. Fdry. Allig. Shear 2½" cap.
8" Canton Allig. Shear-Toggle Type

HAMMERS

6000 Lb. Chambersburg D.F. Steam
3000 Lb. Bliss Board Drop
2500 Lb. Bliss Board Drop
2500 Lb. Chambersburg D.F. Steam
600 and 800 Lb. Bement Steam S. F.
600 and 800 Lb. Union Board Drop
500 Lb. Beaudry Vert. Power
80 Lb. Bradley Helve

PUNCH PRESSES

No. E57 Ferr. Dble. Grd. 2½" Stroke
No. 75½ Bliss Straight Side 6" Str.
No. 6 Amer. Can Co. Style-N, O.B.I.
No. 256 Toledo Db. Crank S.S. 4" Str.
No. 58 Toledo S.S. Trimming
No. 5 Crosby Stiles Type 2½" Str.

GRINDERS

20"x54" Diamond Wet Surface
16"x68" Landis Crankshaft
16"x66" Landis Universal
16"x36" Landis Universal
10"x48" Landis Universal
12"x36" Fitchburg Plain

RADIAL DRILLS

30" American T. A.
36" Gang.
6 Dreses
4 Dreses

SLOTTERS

10-inch Putnam
16-inch Betts
20-inch Niles

PRESSES

750-Ton Mesta Hydraulic Forging
1000-Ton Mesta Hydraulic Forging
1500-Ton Mesta Hydraulic Forging
365-Ton Camden Joggling Press

CRANES

Link Belt Type K-2 Crawler Crane with 40 ft. steel boom, 10 ft. inter. extension cables, 10 K.W. gener. set, 6¼x8 4-cyl. 80 H.P. Waukesha gaso. engine
5-Ton Whiting 35 ft. span, D. C. Elec.
10-Ton Morgan 73 ft. span, D. C. Elec.
10-Ton S. & M. 65 ft. span. D. C. Elec.
10-Ton Indus. 35 ft. Boom Std. Ga. Loco.
15-Ton Indus. 38 ft. Boom Std. Ga. Loco.
15-Ton Amer. 45 ft. Boom Std. Gauge Loco.

STEAM SHOVELS

95-Ton Bucyrus Railroad Type
70-Ton Bucyrus Railroad Type

LOCOMOTIVES

1—36" H. K. Porter Co. Saddle Tank Air equipped 4-wheel switching engine.
1—Baldwin standard gauge 6-wheel switcher 63-ton
1—63-ton American Mogul Type standard gauge sloping tank switch engine
1—Baldwin Locomotive Works standard gauge 4-wheel switcher saddle tank switching engine
1—American Locomotive Works 4-wheel switcher saddle tank standard gauge switching engine

TURRET LATHES

No. 2 Wood Tilted, 1" cap.
No. 3 Wood Tilted, 1¼" cap.
No. 4 Wood Tilted, 1½" cap.
21" Gisholt, 2" cap.

ENGINES

20"x42" Ohio R. H. Corliss
25"x30" Erie 4-Valve Automatic
14"x20" Russell 4-Valve Automatic
12"x24" Buckeye Automatic

BOILERS and STACKS

250 H.P. Std. Water Tube 200 Lbs. Pres.
150 H.P. Horz. Ret. Tub'l 100 Lb. Pres.
100 H.P. Horz. Ret. Tub'l 100 Lb. Pres.
100 H.P. Erie Economic Firebox 100 lbs.
50 H.P. Hor. Firebox 100 lbs. pressure
84"-60"-48"-42"-36"-20"-18" Smoke Stacks

TANKS

26,000 Gallon Horizontal Steel Storage
22,000 Gallon Horizontal Steel Storage
19,000 Gallon Horizontal Steel Storage
15,000 Gallon Horizontal Steel Storage
11,500 Gallon Horizontal Steel Storage
7,700 Gallon Horizontal Steel Storage
7,000 Gal. Closed Rectangular Steel
3,000 Gal. Closed Rectangular Steel
317,000 Gal. Amer. Bridge Steel Water Tank

MISCELLANEOUS

2½" Newton Horiz. Boring Mill
Sull. Dia. Pros. Core Drill 2" core, 400" cap.
No. 4-B Wms. & White Bulldozer
1½" Ajax Forging Machine
Std. Engineering Beam Notcher 16" Str.
2" Curtis Pipe Threading Machine
6" Big. & Keeler Pipe Threading Mch.
7x8 Deane Triplex Power Pump
Allen 66" Pn. Yoke Riveter 13½" gap cap. 1" riv.
Lovekin Pipe Expanding and Flanging Machine, cap. 2" to 6" iron pipe, 2" to 8" copper pipe
Dble. Hd. Plate Milling and Scarfing Machine, capacity up to 1" plate
No. 6 Amer. Sirocco Fans 34,000 cu. ft. cap.
200 H.P. Gen. El. 440-V., 3-P., 60 Cy. A.C. Motor ap. 600
100-Ton Caldwell Hydraulic Wheel Press
400 Amp. Lincoln Arc Welder, D.C.
Foote Burt 4-spindle Heavy Duty Drilling Boring and Reaming Machine
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1—33-51-in.x42-ft. LeBlond.
1—33-51-in.x20-ft. LeBlond.
1—45-in.x24-ft. Pond.
1—44-in.x16-ft. Putnam.
4—40-in.x12-ft. Fifield.
1—36-in.x42-ft. Gisholt Gun Boring.
2—36-in.x42-ft. LeBlond M.D.
3—36-in.x37-ft. N.-B.-P., M.D.
4—36-in.x30-ft. Pittsburgh, G.H.
1—36-in.x24-ft. Pittsburgh, G.H.
1—36-in.x20-ft. Pittsburgh, G.H.
3—36-in.x14-ft. Johnson Triple Gd.
1—36-in.x12-ft. Wickes.
1—32-in.x12-ft. Pittsburgh.
2—30-34-in.x12-ft. Lodge & Shipley Selective Head.
3—30-in.x11-ft. H. S. & G.
2—27-in.x14-ft. Reed-Pren., G.H.
2—26-in.x18-ft. Bridgeford.
4—26-in.x16-ft. Canada.
5—26-in.x16-ft. N.-B.-P.
2—26-in.x16-ft. Whit.-Blaisdell.
10—26-in.x16-ft. Bridgeford.
5—26-in.x14-ft. Bridgeford.
5—26-in.x14-ft. N.-B.-P.
2—26-in.x13-ft. Wickes.
3—26-in.x12-ft. Putnam.
5—26-in.x12-ft. Bridgeford.
13—26-in.x11-ft. Wickes.
30—26-in.x10-ft. N.-B.-P.
21—26-in.x10-ft. Canada.
15—26-in.x10-ft. Whit.-Blaisdell.
3—26-in.x10-ft. Walcott.
54—26-in.x10-ft. Bridgeford.
61—26-in.x 9-ft. Bridgeford.
16—26-in.x 8-ft. Bridgeford.
15—25-in.x12-ft. LeBlond.
5—25-in.x10-ft. LeBlond.
20—25-in.x10-ft. Sidney.
1—24-in.x15-ft. Chard.
1—24-in.x12-ft. Reed-Pren., G.H
9—24-in.x10-ft. Cisco.
1—24-in.x10-ft. American.
10—21-in.x10-ft. LeBlond.
5—20-22-in.x16-ft. American.
5—20-22-in.x12-ft. American.
2—20-22-in.x16-ft. American, G.H
2—20-22-in.x12-ft. American, G.H
1—20-in.x10-ft. L. & S., Pat. Hd
3—20-22-in.x8-ft. American, M.D
2—20-22-in.x8-ft. American, G.H
30—20-22-in.x8-ft. American.
4—20-in.x8-ft. LeBlond.
5—19-in.x8-ft. LeBlond.
2—18-in.x10-ft. Walcott.
1—16-in.x8-ft. Monarch.
3—16-in.x8-ft. Walcott.
11—16-in.x6-ft. Walcott.
1—14-in.x8-ft. Carroll Jamieson.
1—14-in.x6-ft. Lodge & Shipley.
2—14-in.x6-ft. Carroll Jamieson
1—Bogart Crankshaft.
4—8-in. Fitchburg Loswing.
10—3½-in. Fitchburg Loswing.

Gear Cutters and Hobbers

3—No. 36 8M Gould & Eberhardt
2—24-in.x12-ft. Gould & Eberhardt.
3—No. 18-H Gould & Eberhardt.
1—No. 62 Fellows.
13—No. 6 Fellows.
1—No. 5 Lees-Bradner.
1—No. 1 Schuchardt & Schutte.
4—No. 1 Farwell.
1—No. 3—36-in. Brown & Sharpe

Drill Presses

1—No. 30 Natco.
1—No. 41 Natco.
1—No. 17 4-spdl. Foote-Burt, Rail.
1—No. 6 3-spdl. Moline Hole Hog.
1—24-in. Colburn.
2—No. D-2 Colburn.
1—No. 24 Foote-Burt.
1—No. 513 Baker.
1—No. 310 Baker Comp. Table.
1—No. 14 Colburn.
1—22-in. Barnes All Gd. Mfg.
6—20-in. Silver Drills.
16—No. 1-K 8-in. Heury & Wright.

Radial Drills

1—7-ft. Western.
2—3-ft. American Sensitive.

Presses

1—96-G Toledo Double Crank.
2—No. DGG-56 Ferracute, Gd.
5—No. 58 Toledo Nosing.
1—No. 57 Toledo Nosing.
1—No. 163½ Toledo Toggel.

Profilers

2—Pratt & Whitney, Auto.
34—2-spdl. Newton.
8—No. 1 2-spdl. Garvin.
14—2-spdl. Betts.

Horizontal Boring Machines

Table Type

1—2-spdl. Espen-Lucas Boring, Milling and Drilling Machine.
1—No. 3 Beaman & Smith Engine Frame and Cylinder Borer.
1—Beaman & Smith Cylinder Boring and Milling Machine.
1—4-in. Bar Newark.
5—No. 1 Barrett.
7—Rockford.

Floor Type

1—No. 1½ Beaman & Smith.
1—No. 1½ Giddings & Lewis.
1—No. 350 Giddings & Lewis.
1—No. 35 Landis.

Grinders—Cont'd

1—Modern Internal.
1—No. 20 Heald Ring.
2—No. 16-24-in. Besly Ring Wheel
1—3½x36-in. Norton Cam.
1—No. 6 18-in. Besly Ring Wheel.

Slab Milling Machines

1—32x32-in.x12-ft. Ingersoll.
1—24x13-in.x20-ft. Ingersoll.
1—24x 4-in.x 8-ft. Ingersoll.
7—24x24-in.x12-ft. Ingersoll.
1—No. 3 92x54-in.x15-ft. Beaman & Smith Milling and Boring Machine, Planer Type.
1—Beaman & Smith Open Side.
1—3-spdl. Beaman & Smith.

Thread Millers

2—6x14-in. Pratt & Whitney.
7—No. 3E, Lees-Bradner.
3—No. 3 Lees-Bradner.
1—Holden-Morgan.
3—HM Foster.

Automatic Screw Machines

1—No. 6-A Potter & Johnston.
8—No. 5-A Potter & Johnston.
1—No. 56 2¼-in. National-Acme.
3—No. 75 1⅝-in. National-Acme.
1—2-in. Model A Cleveland.
1—1½-in. Model A Cleveland.
1—⅞-1¼-in. Cleveland.
4—⅝-⅞-in. Cleveland.

Hand Screw Machines

1—No. 10 3-in. Bardons & Oliver.
1—No. 5½ Bardons & Oliver.
3—No. 8 Warner & Swasey.
5—No. 6 2¼-in. Warner & Swasey.
1—No. 4¼ 1⅜-in. Bardons & Oliver.
4—No. 4 1½-in. Bardons & Oliver.
20—No. 3 1 5/16-in. Foster.
6—No. 3 1¼-in. Bardons & Oliver.
15—No. 2 1 1/16-in. Foster.
3—No. 2 1-in. Bardons & Oliver.
1—1x15-in. Pratt & Whitney.
2—No. 2 ⅝-in. Pratt & Whitney.

Turret Lathes

2—26-in. Libby.
9—25-in.x10-ft. LeBlond Univ.
26—24-in. Davis.
5—24-in. Steinle.
1—24-in. Gisholt.
2—21-in. Gisholt.
26—21-in.x10-ft. LeBlond Univ.
3—20-in.x 8-ft. American.
25—19-in.x 8-ft. LeBlond.
24—19-in.x 8-ft. LeBlond Univ.
2—2-spdl. Jones & Lamson.
1—15x7-in. Bardons & Oliver.
2—14-in. Foster.
1—1½-in. Pratt & Whitney.

Our guarantee is concise and unmistakable: Your money back if you return a machine within thirty days, freight prepaid. No excuses necessary.

Grinders

1—24x96-in. Norton.
1—20x96-in. Landis.
1—18-30-in.x96-in. Norton.
2—18x96-in. Norton.
3—14x72-in. Norton.
2—14x50-in. Norton.
1—14x48-in. Queen City.
1—14-22-in.x50-in. Norton.
1—12x120-in. Landis.
2—12x36-in. Landis.
4—12x36-in. Modern.
4—12x36-in. Fitchburg.
1—10x96-in. Norton.
2—10x72-in. Landis.
3—10x72-in. Norton.
2—10x50-in. Norton.
1—10x36-in. Landis.
1—10x24-in. Landis.
6— 6x32-in. Norton.
2— 6x18-in. Landis.
4—22-in. P. & W. Surf.
1—No. 2 Cincinnati Univ.
1—No. 2 Fraser Univ.
1—No. 2½ Universal.
2—No. 70 Heald Internal.
1—No. 20 Bryant Internal.
1—No. 10-A Bryant Internal.

Vertical Boring Mills

5—72-in. Gisholt.
1—72-in. Cincinnati.
1—72-in. Colburn.
2—42-in. Colburn.
1—36-in. Bullard New Era.
1—30-in. Bullard.
1—24-in. Bullard Rapid Prod.

Planers

1—72x56-in.x36-ft. Cincinnati, 2 Hds. (Side hds. can be added.)
1—42x42-in.x22-ft. D. & H.
1—42x42-in.x16-ft. Rockford.
1—42x42-in.x 9-ft. N.-B.-P.
3—36x36-in.x18-ft. Cincinnati.
1—36x36-in.x12-ft. Woodward & Powell 2 Hds.
1—36x36-in.x10-ft. Bickett.
1—36x30-in.x20-ft. Whit.-Blaisdell.
1—36x30-in.x18-ft. Whit.-Blaisdell.
1—36x32-in.x12-ft. Gray.
1—30x30-in.x14-ft. N.-B.-P.
1—30x30-in.x10-ft. Woodward & Powell, 3 Hds.
1—24x24-in.x6-ft. Rockford.
1—24x24-in.x6-ft. Hamilton.

Milling Machines

4—No. 4 Cincinnati.
3—No. 4 LeBlond.
5—No. 3-B Heavy B. & S.
1—No. 3 B. & S.
8—No. 3 Kempsmith.
1—No. 2 Kempsmith.
3—No. 2-B Heavy B. & S.
1—No. 1 Brown & Sharpe Univ.
1—No. 1½ LeBlond.
21—No. 3 Garvin.
16—No. 1 Van Norman, Hand.
31—No. 0 Bristol.
5—No. 6 Whitney, Hand.
3—Pratt & Whitney Cam.
1—4-in. Pratt & Whitney Spline
7—Putnam Semi Auto.
1—No. 33 Kempsmith.
175—P. & W. Hendey, Becker and Garvin Lincoln Millers.

Vertical Millers

2—Model ACS 2-spdl. Becker.
3—Model SD Becker.
1—No. 6 Becker.
3—No. 5-C Becker.
3—No. 5-B Becker.
1—Model CS Becker.
3—Model B Becker.
3—No. 3 Cincinnati Hi-Power.
6—No. 3 Brown & Sharpe.
1—No. 3-B Milwaukee.
1—Model AB Becker.
1—No. 2B Milwaukee.
2—No. 4-B Becker.

Miscellaneous

18—Pilton Slotters.
1—No. 2-X Garvin 4-spindle Vertical Tapper.
1—No. D-125 Fairbanks Hammer.
1—20-24 Drill Slotter.
3—No. 4 LaPointe.
1—No. 4 J. N. LaPointe.
1—2-Spindle Hoefer Cylin. Borer.
1—No. 3 75-lb. Beaudry Hammer.

Write for descriptions and prices

HILL, CLARKE & CO. OF CHICAGO

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SIMMONS *New and Used*

MACHINE TOOLS

ATTRACTIVE PRICES **MONEY BACK GUARANTEE**

TESTED BEFORE SHIPMENT

USED MACHINERY IS ONLY AS DEPENDABLE AS THE COMPANY WHO SELLS IT

THE CREAM OF THE MARKET

BORING MILLS
1—10′ NILES VERTICAL MILL.
1—No. 3 BARRETT HORIZONTAL BORING MILL.
1—No. 0 GIDDINGS & LEWIS BORING MILL.
1—5″ BAR BEAMAN-SMITH FLOOR TYPE.
1—4″ BAR NILES HORIZ. MILL.
3—24″ BULLARD R.P., SIDE HEAD.
1—34″ BERTRAM (NILES) TURRET.
1—36″ BULLARD RAPID PROD.
2—42″ BULLARD, TWO HEADS.
1—54″ COLBURN, TWO HEADS.
1—54″ BULLARD, RAPID TRAVERSE.
1—60″ CINCINNATI VERTICAL RAPID TRAVERSE.
1—72″ NILES TWO SWIVEL HEADS.
1—84″ POND SPC. X HEAVY TWO SWIVEL HEADS.
1—84″ NILES BORING MILL, TWO SWIVEL HEADS.

DRILLS
1—24″ MUELLER GEAR BOX RADIAL DRILL.
1—28″ AMERICAN HIGH SPEED.
1—60″ NILES SEMI UNIVERSAL.
1—6′ NILES FULL UNIVERSAL RADIAL.
1—6′ AMERICAN RADIAL GEAR BOX.
1—6′ CINCINNATI BICKFORD PLAIN, S. P.
1—7′ REED PRENTISS GEAR BOX, MOTOR DRIVE, LATEST TYPE.
1—No. 3 BAUSH MULTIPLE SPINDLE, 36.
4—No. 12 and 13 P. & W. MULTIPLE DRILLS,
1—No. 14 NATCO MULTIPLE SPINDLE, 20.
1—No. 30 BAUSH, 8-SPINDLES.
1—No. 32 NATCO MULTIPLE SPINDLE, 30.
1—No. 41 NATCO MULTIPLE SPINDLE, 20.
1—2-D MOLINE, 4-, 6- OR 8-SPINDLES.

GRINDERS
2—No. 1 B. & S. UNIVERSAL GRINDERS.
4—No. 1 NORTON TOOL CUTTER GRINDERS.
1—No. 14 B. & S. WIDE WHEEL GRINDER.
1—No. 14 PRATT & WHITNEY SURFACE GRINDER.
6— 6″ x 32″ NORTON PLAIN GRINDERS.
1—10″ x 36″ NORTON PLAIN GRINDER.
1— 4″ x 30″ P. & W. CYLINDRICAL GRINDER.
3—14″ x 50″ NORTON GRINDERS.
2—14″ x 72″ NORTON GRINDERS.
1—14″ x 96″ NORTON GRINDER.
1—20″ x 72″ B. & S. No. 5 UNIV. GRINDER.
1—26″ x 144″ LANDIS GRINDER.

MILLERS
1—48″ x 23″ x 20′ INGERSOLL MILLER.
1—36 x 36 x 20′ INGERSOLL SLAB MILLER.
2—No. 5 BROWN SHARPE PLAIN MILLERS.
1—No. 4 BROWN SHARPE PLAIN MILLER.
1—No. 3 BROWN SHARPE PLAIN MILLER.
1—No. 3-B HENDEY PLAIN MILLER.
1—No. 2 CLEVELAND PLAIN MILLER.
1—No. 2½ LEBLOND UNIVERSAL MILLER.
1—No. 2½ ROCKFORD UNIVERSAL MILLER.
1—No. 3 CINCINNATI H. P. PLAIN.
1—No. 2½-B MILWAUKEE VERTICAL.
2—No. 3 CINCINNATI VERTICAL MILLERS.
1—No. 4 CINCINNATI VERTICAL MILLER.
1—3-E LEES BRADNER THREAD MILLER.

SHAPERS
1—32″ SMITH MILLS SHAPER.
2—28″ GOULD-EBERHARDT SHAPERS.
1—28″ QUEEN CITY SHAPER.
1—24″ CINCINNATI CONE SHAPER.
1—15″ POTTER-JOHNSON SHAPER.

PLANERS
1—24 x 24 x 6-8-10′ WHITCOMB SECOND BELT.
1—24 x 24 x 12 AMERICAN, TWO HEADS.
1—30 x 30 x 18 CINCINNATI TU SPEED HEAVY.
1—36 x 36 x 8 DETRICK HARVEY OPENSIDE, FOUR HEADS, SELF CONTAINED.
1—36 x 36 x 10 AMERICAN, FOUR HEADS, SELF CONTAINED MOTOR DRIVE.
1—36 x 36 x 10 N. B. P. REVERSING TYPE MOTOR.
1—36 x 36 x 18 NILES BEMENT POND, FOUR HEADS, REVERSING TYPE M. DRIVE.
1—36 x 36 x 80 WOODWARD POWELL, LIKE NEW, REVERSING MOTOR DRIVE.
1—42 x 42 x 26 POND PLANER, FOUR HEADS, REVERSING MOTOR DRIVE.
1—60 x 60 x 14 POWELL HEAVY.
1—60 x 60 x 20 N. B. P., FOUR HEADS, MOTOR.
1—60 x 60 x 22 POND, THREE HEADS.
1—60 x 60 x 26 DETRICK HARVEY, THREE HEADS, OPENSIDE.
1—72 x 72 x 18 DETRICK HARVEY, LATEST TYPE, OPENSIDE, THREE HEADS, MOTOR DRIVE.

LATHES
1—72″ x 56′ N. B. P. MOTOR DRIVE LATHE.
1—72″ x 35′ BEMENT NILES TRIPLE GEAR.
2—60″ x 35′ BEMENT TRIPLE GEAR.
2—54″ x 34′ BEMENT NILES TRIPLE GEAR.
2—50″ x 36′ PITTSBURGH, WITH MOTOR.
1—48″ x 36′ PITTSBURGH, GD. HD., RPD. TRAV.
1—48″ x 18′ N. B. P. TAPER ATTACHMENT.
1—42″ N. B. P. CAR WHEEL TURNING.
1—36″ x 60′ BRIDGEFORD BORING, G. H.
2—36″ x 23′ AMERICAN FULL, G. H.
2—36″ x 14′ PUTNAM MOTOR DRIVE.
1—34″ x 22′ POND CONE DRIVE.
1—32″ x 25′ RECON GEARED HEAD.
1—30″ x 14′ LODGE & SHIPLEY.
1—30″ x 11′ AMERICAN GEARED HD., ARRANGED MOTOR DRIVE.
1—26″ x 16′ PRENTICE GEARED HEAD.
1—25″ x 12′ LEBLONDE HEAVY DUTY, MOTOR.
1—25″ x 10′ LEBLONDE MOTOR DRIVE.
1—24″ x 12′ GRAVES KLUSMAN.
1—18″ x 16′ CINCINNATI CONE O. C. C.
1—18″ x 10′ SIDNEY GEARED HEAD.
1—EK—2 VERTICAL TURRET LATHE.

MISCELLANEOUS
2—24″ GOULD EBERHARDT CONE GEAR CUTTERS.
1—37½ BLISS STRAIGHT SIDE PRESS.
1—DDG55 FERRACUTE DRAWING PRESS.
1—No. 5 FERRACUTE PRESS.
1—21-TON WOOD VERTICAL HYDRAULIC PRESS.
1—5-A LESS BRADNER M.D. GEAR CUTTER.
1—48″ GLEASON BEVEL GEAR PLANER.
1—60″ GLEASON BEVEL GEAR PLANER.
1—No. 36BM GOULD EBERHARDT GEAR ROUGH
1—No. 36S GOULD EBERHARDT ROUGHER.
1—16-FT. GLEASON PLANER 36″ FACE.
1—HILLES JONES GUILLOTINE SHEAR.
1—5 x 5 CARLIN ALLIGATOR SHEAR.
1—10,000-LB. STEAM FORGING HAMMER.
1—No. 652 NIAGARA SQUARING SHEAR.
1—No. 5-B NAZEL HAMMER.
1—300 LB. BRADLEY HELVE.
1—MORGAN PLATE SHEAR.
1—No. 4 SAUNDERS PIPE MACHINE.

Simmons Machine Tool Corp.

BUFFALO OFFICE
88 EXCHANGE ST.

ALBANY, N.Y.

NEW YORK OFFICE
149 BROADWAY

MACHINES AND TOOLS FOR SHEET METAL WORK MACHINE TOOLS NEW STEEL BARS PIPE AND TUBING

Just Purchased

At bankrupt sale and private sale. 3 large plants. The United States Headlight Mfg. Co., Buffalo, consisting of 500 machine tools, 200 sheet metal working machines and tinsmith tools, enormous lot of bench tools, vises, stake holders, forming tools, blow horn, stakes, double seaming stakes, hatchet stakes, Beakhorn stakes, tinners' hand snips, etc. Another bankrupt sale: All the machinery from a compressor plant and one large machine shop, consisting of 300 machine tools used only from 1 to 3 years. Photo and full description mailed on application. Money back guarantee on any machine tools. This list will appear every other week in IRON AGE. This is only a partial list.

LATHES

2—16" x 6' Hamilton, $250.00 each, 90% new.
1—20" x 8' LeBlond heavy duty, quick change gear, $500.00, 90% new.
1—18" x 8' American, quick change gear, $500.00, 90% new.
1—26" x 26" x 16' Rahn-Larmon, quick change gear, gap lathe, $600.00.
12—20" x 10' American Rad. Co. Heavy Duty Manufacturing Lathes, not screw cutting, $550.00 each, 95% new.
7—20" x 8' New Heavy Duty Hindman-Duff Manufacturing lathes, not screw cutting, $350.00 each.
6—16" x 6' Blaisdell, $250.00 each, 90% new.
1—24" x 10' Porter, $500.00, 90% new.
1—26" x 8' Greaves-Klusman, $500.00, 90% new.
2—36" x 14' Putnam Heavy Duty, $750.00, 90% new.
1—36" x 8'6" low down bed spinning lathe with swivel compound rest, $750.00, 90% new.
50—Engine Lathes from 16" to 26" swing, 8' bed to 21' bed, $250.00 and upward including chucks.

MILLING MACHINES

1—Cincinnati No. 3 Universal Milling Machine, dividing head and vise, 90% new, $900.00.
2—Brown & Sharpe Plain Millers, dividing head and vise, $350.00.
1—Garvin No. 13 Plain Miller, 90% new, $350.00.
3—Garvin No. 2 Hand Milling Machines, $200.00.
1—Pratt & Whitney No. 13 Plain Miller, 90% new, $150.00.
15—Hand Millers at $100.00 each.

DRILLING MACHINES

1—4'6" Dreses-Mueller Radial, gear box drive, plain, 90% new, $750.00.
1—36" Rockford Heavy Duty, sliding head, 95% new, $450.00.
1—30" Rockford Heavy Duty, sliding head, 95% new, $350.00.
6—36" Cincinnati, sliding head, 90% new, $200.00.
6—22" Barnes, sliding head, 90% new, $150.00.
20—18" Snyder, Rockford, Buffalo Forge at $100.00 each, 90% new.
15—Barnes Speed Drills at $40.00 each, 90% new.
1—Barr & Co., 5 spindle Upright Sensitive Gang Drill, 90% new, $350.00.

SHAPERS AND GEAR CUTTERS

2—16" stroke, Smith & Silk back geared shapers, cone drive, $250.00.
2—20" stroke, Geo. Juengst back geared shapers, cone drive, $300.00.
1—20" stroke, Hendey back geared shaper, cone drive, $350.00.
2—20" stroke, Walcott heavy duty, back geared crank shapers, cone drive, 90% new, $600.00.
1—26" stroke, Gould & Eberhardt back geared crank shaper, cone drive, 90% new, $750.00.
1—28" stroke, Gould & Eberhardt back geared crank shaper, cone drive, 90% new, $900.00.
1—24" Gould & Eberhardt automatic gear cutting machine, 90% new, $450.00.

TURRET LATHES

2—No. 4½ Bardon & Oliver, $450.00 each.
1—No. 4 Bardon & Oliver, $400.00.
2—No. 2 Pratt & Whitney, $250.00 each.
2—No. 2 Bardon & Oliver, $250.00 each.
2—Cleveland Model A 2½ Automatic Screw Machines, $500.00 each.
5—No. 1 Pratt & Whitney at $200.00 each.
1—No. 1 Wells Screw Machine, $150.00.
10—½" Garvin No. 1-O Screw Machines at $90.00 each.
2—Lodge & Davis Fox Turret Lathes, $350.00 each.

WOODWORKING MACHINES

3—Powell & Co. 16" Buzz Planers or Hand Jointers, $175.00 each.
2—H. B. Smith Swing Cut-Off Saws at $100.00 each.
6—24"-30"-36"-42" Band Saws from $100.00 to $350.00.
3—Powell & Co. Heavy Duty Iron Frame Rip Saws, iron beveling top, $175.00.
2—Double Spindle Shapers, $100.00 each.
1—3 Spindle Automatic Shaper, $350.00.
3—Wood Frame Saw Tables at $35.00 each.
6—Wood Turning Lathes at $35.00 each.

SPECIAL BARGAINS

25—PRATT & WHITNEY 12" heavy type automatic milling machines with receding table, 3 Tee slots in table, 90% new. My price $500.00, factory price $1,200.00. Sold already 225 of these millers. Photo and specifications mailed on application.

SPECIFICATIONS

RANGE
Table working surface.....6¾x18"
Table travel ..... 12"
Table center to end of spindle, maximum 8¼"
Table center to end of spindle, minimum 3"
Table center to end of spindle, maximum 8¾"
Table top to center of spindle, minimum 1¾"
Head spindle to foot-stock spindle, maximum 17"

SPINDLE
Spindle diameter .....2¼"
Taper hole in spindle.....No. 11, Jarno
Spindle gear, pitch diameter.....12"
Spindle speeds, regular
44, 65, 93, 103, 146, 212 R.P.M.
Spindle speeds, special (to order only)
40, 51, 77, 122, 180, 242 R.P.M.

TABLE FEEDS (Independent of Spindle Speeds)
Inches per minute
.37, .53, 1.14, 1.75, 3.03, 4.55, 6.3, 9.2
Rapid traverse of table forward 208" per min.
Rapid traverse of table, return, 303" per min.

DRIVE
Driving pulley, diameter .....12"
Driving pulley, speed.....850 R.P.M.
Belt width .....3"

SPEED GEARS, 22 and 48 teeth
28 and 42 teeth
*34 and 36 teeth

FEED GEARS, 30 and 120 teeth
40 and 100 teeth
*30 and 100 teeth
*65 and 85 teeth

FLOOR SPACE .....54"x54"

WEIGHT
Net weight .....3750 lbs.
Gross weight, boxed for export.....4550 lbs.
Cubic feet of box.....130

75—PRATT & WHITNEY No. 12 2-spindle vertical profiling machines with countershaft, oil pump piping, 90% new. Weight 4,000 lbs. Price $200.00. Factory price $1,100.

SPECIFICATIONS

The table, which has a working surface 12 x 15 inches (305x381 millimeters) has a cross traverse of 23½ inches (597 millimeters). The heads have a longitudinal traverse of 26⅝ inches (680 millimeters) and a vertical adjustment of 3¾ inches (95 millimeters). Distance between uprights is 19 inches (482 millimeters).

These machines are specially adapted for accurate and interchangeable work. A roughing and a finishing milling cut may be taken at one setting of the piece, with this machine. The spindles are belt driven and can be driven at very high speed without excessive driving-shaft speeds. Ball thrust bearings are provided at each end of both gear and pinion, thus permitting the spindle to be run equally well in both directions.

The gearing for operating the table and head is constructed so as to permit the taking up of all back lash by means of double gears and double racks, one part of which may be adjusted in relation to the other part.

15—PLANERS

Gray Worcester planers, one head on cross rail 36" x 36" x 10', 30" x 8', 24" x 24" x 5' at $350.00 each.

MISCELLANEOUS

1—No. 5 Toledo Geared power punch press, $500.00.
25—Chain Hoists 1, 1½, 2, 3, 4, and 10-ton capacity.
1—16" Putnam Slotter.
1—18" Niles Pulley Boring Mill.
2—Double Spindle Diamond Wet Grinders.
2000 New Steel Split Pulleys, all sizes.
75—Steam Pumps and Air Compressors.
6000 ft. 1 15/16" diameter and 2 7/16" diameter cold rolled Line Shafting with couplings to match.
1200 Hangers and Boxes.
2000 Slightly Used Milling Cutters, High Speed and Carbon.
3000 Slightly Used Twist Drills, High Speed and Carbon.
2000 Reamers, very cheap. Send your inquiries, have all sizes. State whether High Speed or Carbon.
10,000 lbs. High Speed Tool Steel Scrap, excellent quality. State best cash price for same.

MOTORS and GENERATORS

100—3-phase, 25-cycle, 220-440-volt, Westinghouse, General Electric, Crocker-Wheeler Motors, from 5 H.P. to 50 H.P.
25—Transformers, 10-15-20-30-35 K.W.
25—Generators, from 5 K. W. to 250 K. W.
10—Motor Generator Sets for testing and charging batteries.

PIPE and TUBING

25,000 ft. 1" pipe.
50,000 ft. 1¼" pipe.
20,000 ft. 1½" pipe.
25,000 ft. 2" pipe.
10,000 ft. 2½" pipe.
5,000 ft. 5" pipe.
2,000 ft. 6" pipe.
2,000 ft. 8" pipe.
300 Ton New Mill seconds.

BOILER TUBES

60,000 ft. 3¼".
5,000 ft. 4".

HIGH SPEED and CARBON TOOL STEEL

200 tons in round and flats from 7½c. to 10c. per lb.
200 tons New Chrome Nickel Bars, 1⅝" round and 2¼" round. Carbon, .35-.45; Nickel, 2.25-2.75; Chrome, 1.25-1.75. Price $60.00 per ton.
200,000 lbs. 2⅜" round cold rolled Steel Mill lengths. Price $45.00 per ton.

LEATHER and RUBBER BELTING

20,000 ft. New Rubber Belting, up to 12" wide.
20,000 ft. Slightly Used Rubber Belting, from 6" to 30" wide.
100,000 ft. Good Usable Leather Belting, single and double ply, from 1" up to 12" wide.
2,000 ft. 30" wide 6-Ply Rubber Conveyor Belting. ⅛" rubber covering, highest grade belting made, very good condition at $2.00 per ft. Factory price $5.00 in any quantities.

Jacob Ullman, 48-82 Oneida St., Buffalo, N. Y.

LAST CALL ON SURPLUS MACHINERY
AT THE COLT'S PATENT FIREARMS PLANT, HARTFORD, CONN.
SACRIFICE PRICES

DRILLING MACHINES

1—Dwight Slate 14" 4 Spindle Drill Press
1—Dwight Slate 14" 2 Spindle Drill Press
1—Dwight Slate 15" 3 Spindle Drill Press
1—Dwight Slate 15" 2 Spindle Drill Press
2—Garvin No. 3 4 Spindle Drill Press
1—Garvin No. 3 6 Spindle Drill Press
12—Langelier 2 Spindle Drill Presses
3—Langelier 3 Spindle Drill Presses
1—Langelier 6 Spindle Drill Press
1—Leland-Gifford 1 Spindle Bench Drill Press
7—Pratt & Whitney No. 11 Multiple Drills
2—Sigourney 1 Spindle Drill Presses
1—Colt Cone Drilling Machine
41—Pratt & Whitney No. 1 2 Spindle Gun Barrel Drilling Machines with 6' Beds
3—Pratt & Whitney No. 1 2 Spindle Gun Barrel Drilling Machines with 9½' Beds

GRINDERS

2—Barnes Precision Grinders
4—Colt Cutter Grinders
1—Bench Grinder on Stand
1—Diamond Grinding Machine
1—Greenfield 24" Saw Sharpener
5—Greenfield Universal Grinders
1—Higley No. 7 Saw Grinder
2—Leblond No. 2 Universal Grinders
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2—Pratt & Whitney Contour Cutter Grinders
11—Pratt & Whitney Barrel Spot Grinders
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3—Whitney 20" Water Tool Grinders
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1—Steel Product Co. No. 1 Universal Gauge Grinder

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1—Davis 12x5 Close Coupled Lathe
1—Garvin 12x5 Lathe
2—Hendey 12x5 Lathes
1—Leblond 12x6 Lathe
7—Leblond 14x6 Lathes
7—Lathe Morse 15x5 Engine Lathes
1—Meriden Turret Lathe
3—Pratt & Whitney 1x15 Turret Lathes
4—Pratt & Whitney 1½x18 Turret Lathes
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6—Pratt & Whitney Barrel Turning Lathes
2—Pratt & Whitney Turret Lathes No. 3
1—Pratt & Whitney 15x6 Engine Lathe B. G. Screw
1—Phoenix 14x8 Lathe
3—Pryibil 14x5 Stud Lathes
2—Reed-Prentice Multo. Tool Gun Barrel Turning Lathes
4—South Bend No. 34 13x5 Lathes
2—Wells No. 100 A 11x4 Speed Lathes
3—Willard 13x6 Engine Lathes
1—Shepard 18x6 Engine Lathe
2—Wood & Light 15x5 Engine Lathes
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38—Polishing Jacks, Misc. sizes and types

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4—Pratt & Whitney No. 14 Profilers, 2 Spindle
2—Pratt & Whitney 2 Spindle Auto. Profilers

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3—Cochrane Bly No. 2 Metal Saws
1—Higley No. 11½ Cold Metal Saw
2—Higley No. 12 Cold Metal Saws
2—Higley No. 14 Cold Metal Saws
1—Colt Saw
1—Millers Falls Hack Saw

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10—Bardons & Oliver No. 3 1¼" Screw Machines
1—Bardons & Oliver No. 7 2" Turret Lathe
5—Biggs No. 2 Hand Screw Machines
5—Colt Screw Machines
2—Cleveland ⅞" Auto. Screw Machines
2—No. 3 Foster Plain Hand Screw Machines
2—No. 4 Foster Screw Machines
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6—Garvin No. 2 Hand Screw Machines
4—Garvin No. 3 Hand Screw Machines
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½" Van Dorn Electric on stands.
Hisey-Wolf sensitive friction drive.
3' American Sensitive Radial.

GRINDERS
No. 24 Gardner Vertical Disc.
No. 3½ E Van Norman Raceway.
12 x 32 Landis Universal.
No. 1 Landis Universal.
12 x 36 Modern Plain.
10 x 52 Landis Plain.
No. 13 B & S Universal Tool.
Yankee drill Grinder.
No. 60 Heald Cylinder.
No. 10-A Bryant Deep Hole.
6 x 32" Landis Plain Cylindrical.
Type D 24" Norton Snagger.
30" Blount, wet.
20" Blount, wet.

GENERATORS
125 KW D. C. General Electric, Belt drive.
12½ KW Triumph Steam Driven.
25 KW G. E. Gasoline Engine Driven.
20 KW Burke with 30 H.P. Motor.
2½ KW Westinghouse, 5 H.P. Motor.
0.6 KW 6 volts, Peerless.

LATHES
12" x 6' Davis D. C. Motor driven.
12" x 6' Reed.
16" x 6' LeBlond.
16" x 6' LeBlond Rapid Production.
16" x 6' Hendey.
18" x 13' Chard.
17" x 8' Sidney.
18" x 8' Barnes.
18" x 8' Wolcott.
20" x 8' Bradford.
48" x 10' Pratt & Whitney.

MILLS
42" Bullard Vertical.
No. 14 Garvin Mfg. Plain.
5" Pratt & Whitney, Semi-Automatic.
No. 7 H Becker Lincoln Type.
No. 7 Becker Lincoln Type.
Type A Briggs.
Type B Briggs.
No. 3½ Fox, Hand.
No. 1 Garvin, Hand.
No. 0 Bristol, Hand.
No. 10 P & W, Hand.
No. 6 Whitney, Hand.
No. 1 U. S., Hand.

MISCELLANEOUS
No. 2074 Gould & Eberhardt Hobber.
75 Lb. Fairbanks Power Hammer.
No. 1 Farwell Gear Hobber.
19" Cast Iron Drop Hangers.
18" Crescent Jointer.
32" Crescent Band Saw.
No. 303 Defiance Double Spindle.
Automatic Copying Lathe.
No. 7½ Bellvue Furnace.
30" x 36" Sheet Iron Forge with Irons.
No. 2 Whiting Brass Casting Furnace.
6 H.P. International Gas Engine.
3 H.P. International Gas Engine.
110 lb. Anvil.
No. 3 Magic Chucks.
No. 2 Magic Chucks.
No. 1 Magic Chucks.
24" x 6" Heald Magnetic Chuck.

RICHEY-WHALEY MACHINERY COMPANY
21 E. South Street
Indianapolis, Indiana

1½", 2½", 3½" Acme St. Bed Forg. Machines
2" Iron Bed Ajax Forging Machine
No. 5-6-25-26U W-W Bulldozers
18'x¾" Bertsch Bending Rolls
18'x⅝" Bertsch Bending Rolls
½" McCabe Flanging Machine
42"x30' Pond Lathe, face plate drive.
57, 58½, 59 Toledo Press, tie rod
96" L&A Multiple Punch, 350 ton
48" tht. Punch, 1¼" thru 1", M.D.
100 lb. Bradley Helve Hammer
54"x3/16" L&A Gate Shear, 7" gap
96"x1" H&J Straightening Rolls
No. 1 Kane & Roach Straightener
12'x2" United Engng. Shear
74"x1" H&J Shear, 26" gap

This is only a partial list.

McCoy-Brandt Machinery Company
210-14 Penn Ave. Pittsburgh, Pa.

Attractive Bargains

4—CLEVELAND Model "A" 2¼" capacity Turret Full Automatics, length of stock feed 12⅝", milling length 7", weight about 6213 lbs.

PRICE $450.00 each

5—CLEVELAND Model "A" 2¾" capacity Turret Full Automatics, length of stock feed 13⅝", milling length 7⅝", weight about 8926 lbs.

PRICE $550.00 each

4—CLEVELAND Model "A" 4¼" capacity Turret Full Automatics, length of stock feed 16⅝", milling length 9", weight about 11,604 lbs.

PRICE $650.00 each

These machines are in fine shape. Act quick if you want one. Guaranteed.

BOTWINIK BROTHERS, INC.
67 Water St., New Haven, Conn.

Jersey City Stock

COLD SAW, 22" Blade Gleim, 6" rounds.
FRICTION SAW, Ryerson No. 3 DC.
RADIALS, 6' Pond; 4' Dreses Cone Dr.
LATHE, 16" x 8' Davis. ¼
LATHE, 20" x 15' Reed, 11' centers.
LATHE, 30/52" x 12' with 24" removable gap.
LATHE, 28/48" x 14' Harrington Gap.
TURRET LATHE, No. 2A Warner & Swasey.
MILLER, No. 3 LeBlond, Plain.
PLANER, 54" x 54" x 12' Pond, 4 Hds., Belt.
PLANER, 32" x 32" x 8' Gray, 2 Hds.
PLATE PLANER, 18' Niles.
PIPE MACHINES, 8 and 10" Cox, Belt.
PUNCH & SHEAR No. 2 Long & Allstatter. Double End, 24" throat.
BAR SHEAR, No. 2 H. & J. 2½" capty.

BENNETT MACHINERY CO.
30 Church St. New York City

MACHINERY

READY TO SET UP AND OPERATE
Some are brand NEW and some have been USED
All of them are GOOD INVESTMENTS

SCREW MACHINES

4—No. 00 B. & S. Automatics
2—No. 2 B. & S. Automatics
1— ⅞" Cleveland Automatic
1—1¼" Cleveland Automatic
1—2¼" Cleveland Automatic
1—2¾" Cleveland Automatic
2—No. 0 B. & S. Hand Screw Machines
1—No. 8 Bardons & Oliver Screw Machine
1—No. 9 Bardons & Oliver Screw Machine
1—No. 2 Bardons & Oliver Screw Machine
1—No. 6-A Potter & Johnson Screw Machine

SHAPERS

1—16" Ohio single geared
1—16" Smith & Mills single geared
1—25" Smith & Mills back geared

DRILL PRESSES

1—4 Spindle 24" swing W. F. & Jno. Barnes Style B.
1—3' Prentiss Radial Drill
1—4 Spindle 20" Barnes B. G. Drill
1—No. 15 Foote Burt 3 Spindle Drill
1—28" W. F. & Jno. Barnes Upright Drill
1—2½' Fosdick Radial Drill cone type
1—28" Cincinnati Sliding head with geared tapper
6—14" Sensitive Drills
1—4 Spindle Prentice Bros. Niles Heavy Duty adjustable Rail Drill with No. 4 Morse Taper, size table 12'x18"

GRINDERS

1—No. 1 Wilmarth & Morman Universal
1—No. 2 Taft Pierce 10 x 30
1—60" Springfield Face Grinder
1—No. 11 Brown & Sharpe plain
1—12 x 48 Queen City plain
1—12 x 48 Modern plain
1—No. 1 Cincinnati Tool and Cutter
1—No. 6 Rivett Internal
1—Madison Cylinder Grinder
1—No. 3 Rivett Internal
1—No. 2 Oakley Universal Tool and Cutter

LATHES

2—11 x 4 Seneca Falls
1—12 x 5 Mulliner Q.C.G.
1—15 x 6 South Bend
1—16 x 6 Rahn Lamon Q. C. G.
2—20 x 8 Roulsted
1—20 x 10 Rahn Lamon Q. C. G.
1—42 x 22 Bridgeford Motor Drive geared head

MILLERS

1—No. 2 Kempsmith Plain Latest Type
1—No. 2 Hendy Norton Plain
1—No. 2-A Garvin Universal
1—No. 25 Bilton Plain
1—No. 1-M Cincinnati Universal
2—No. 2½ Bilton Automatics
1—No. 5½ Bilton Automatic
18"x8' Beaman Smith
24"x8' Ingersoll

PUNCH PRESSES

1—No. 20 Bliss Plain Inclinable 2" stroke
1—No. 2 Stiles Punch Press
6—No. 3 Baxendale Inclinable weight 1100 lbs.
1—No. 4 Toledo Inclinable
3—No. 4 Baxendale Inclinable weight 1950 lbs.
1—No. 6 Baxendale Inclinable weight 3300 lbs.

MISCELLANEOUS

1—60" Niagara Universal folder and brake
1—No. 103-A Grant Riveter motor drive 60 cy. 220 V. 3 Ph.
1—16" Betts Vertical Slotter like new
1—No. 2 Cochran Bly Filling Machine
1—No. 2 Cochran Bly Cut-Off Machine
1—¼ Rickert Shaper vert. tapper
1—½ Rickert Shaper vert. tapper
1—Cleveland Guillotine Shear 12" blade 2½" sq. cap.
1—3" Davis Cutting off machine
1—2 X Garvin Tapping Machine
1—24 x 24 x 8 Wilson Planer
1—No. 320Z Tate Jones Furnace, like new
1—56 x 56 x 32 Cincinnati Planer, 4 heads reversing motor drive, 220 volt, D. C.

Any Machine May Be Returned Freight Prepaid Within 30 Days.
Write, Phone, Wire at Our Expense.

HOMER STRONG & CO., Inc.

285 State Street — Rochester, N. Y.

Very Fine Boring Mill

10' Cincinnati rapid production vertical Boring Mill, power rapid traverse, 2 heads, excellent condition. Arr. for motor.

36" Niles vert. boring mill, 2 heads.
16" Gould & Eberhardt BG shaper.
36" Cin.-Bickford plain radial, gear box.
42" Am. Tool Wks. plain radial, gear box.
No. 85 Heald internal grinders (2).
36" Am. Tool Wks. sens. radial, ser. 51959.
No. 3 LeBlond plain miller, vert. attach.
No. 169¼ Toledo toggle press.
No. 32 Michigan punch press.
No. 55 Adriance double crank press.
Lots of other machines. Send us your inquiries.

A. D. White Machinery Co.
108 N. Jefferson St., Chicago, Ill.

Bargains—Prices Right

18x8 Lodge & Shipley 3 Step Cone, Q.C.
Bullard Multi-Matic A-1 condition.
No. 2½ Rockford Universal Miller.
42" Gisholt Boring Mill.
16" Milwaukee Shaper, Cone Drive.
12x36 Cincinnati Universal Grinder.
12x48 Cincinnati Universal Grinder.
56x56x32 Cincinnati Planer, 4 heads, complete reverse, motor drive and control.
54"x48"x24' Woodward & Powell Planer, 4 heads, belt drive.
4¼" Cleveland Automatic.
1¾" Cleveland Automatic.
No. 2 and No. 3 Cincinnati Vertical High Power Millers.
10x72 Norton Plain Grinders.
15—5A and 6A Potter & Johnstons.
No. 4 Becker Vertical.
No. 642 Niagara Shear No. 10 gauge cap.
No. 4 Ohio Universal Miller.
10' Ohl Brake.
Bath Spline Shaft Grinder.
No. 14 Gardner Ball Bearing Dbl. Disc Grinder.
2—6" Cleveland Automatic Model A.

CRANE
SCHIEFER
OWENS, INC.

Buffalo—Rochester—Syracuse

A FEW FROM OUR LARGE STOCK

3½' Morris Radial Drill S. P. D.
No. 3 Milwaukee Plain Milling Machine.
No. 3 and 4 Cincinnati Vertical Millers.
30" x 24" x 8 ft. Adj. rail Miller.
20" Kelly Shaper.
No. 242 Niagara Power Squaring Shear.
No. 562 Niagara Power Gap Squaring Shear.
Two No. 83 Consolidated Horning Presses.
Two No. 3 Niagara O. B. I. Presses.
No. 1 Toledo O. B. I. Press.
No. 67 Consolidated S. S. Press.
30" Diamond Motor Drive Face Grinder.
Model D-1 Becker Vertical Miller.

Complete Stock.

Send Us Your Inquiries.

Riverside Machinery Depot
251 St. Aubin St., Detroit, Michigan

GRINDERS—

ALL LIKE NEW

No. 4 Cincinnati Plain 16 x 72.
No. 2 Cincinnati Plain 12 x 36.
No. 2 Cincinnati Universal 12 x 36.
No. 1 Bath Universal Cutter—Tool Room.
No. 103 Rivett Internal.
Walker Rotary Surface—10" magnetic chuck.

THE M. D. LARKIN COMPANY
Machinery Division
125 E. Second St. Dayton, Ohio

No. 60 Heald Cylinder Grinders.
12 x 72 Cincinnati Universal Grinder.
42" American Band ReSaw.
Sipp 6-spindle BB Drill Press, No. 1 M.T.
3—Williams & White No. 400 Air Hammers.
Landis 6 x 18 Self Contained Grinder.
3¼" x 36" Acme Flat Turret Lathe, full bar and chucking equipment, single pulley drive, roller feed, all geared head, cross feed stops, 15" Chuck master collet, full set collet pads, 15 tool holders.
Hoskins F.C. 206 Electric Muffle Furnace, 18½" x 9" x 12". 1100 Amperes. Serial No. 5164D. Switchboard, Instruments and Carbons, $700.00.
18" x 58" Landis Self Contained Crankshaft Grinder.
24" Ingersoll Cutter Grinder with countershaft.
Punch Presses, Drill Presses, Milling Machines, Shapers, Hand and Automatic Screw Machines. Our Stock is continuously changing. Write for lists.

THE WAYNE MACHINE CO.
Metal and Woodworking Machinery
934 Ft. Wayne Ave. Phone Riley 4076
INDIANAPOLIS, IND.

6' arm Bickford radial drill
No. 2 Williams-White eye bender
No. 2 Mitts & Merrill keyseater
10" x 72" Brown & Sharpe plain grinder
No. 2 Brown & Sharpe miller
No. 1½ Rockford plain miller
No. 1 S. & S. Gear Hobber
54" S. & S. gear hobber
No. 1 Farwell-Adams gear hobber
2" x 24" J. & L. geared head turret lathe
30" x 84" Diamond face grinder
No. 2 Hess taper rolling machine
60 lb. Bradley hammer
No. 2 P. & H. Drilling & Boring machine
24" x 24" x 6' Pond planer
90"—300 ton hydraulic wheel press

Wm. C. Johnson & Sons Machinery Co.
1211-1223 N. 12th St., St. Louis, Mo.

REAL VALUES REBUILT MACHINE TOOLS

MILLING MACHINES

No. 4 Brown & Sharpe Cone Type Complete.
No. 3 R. K. LeBlond Cone Type Complete.
No. 2 R. K. LeBlond Cone Type Complete.
No. 1½ Rockford Universal Cone Type Complete.
No. 5 R. K. LeBlond Heavy Duty Plain Single Pulley all Geared.
No. 4 Cincinnati Plain Cone Type.
No. 3 R. K. LeBlond Plain Cone Type.
No. 3 Cincinnati Plain Cone Type.
No. 2 Brown & Sharpe Plain Cone Type.
No. 2 Kempsmith Plain Cone Type.
No. 0 Cincinnati Plain Cone Type.
No. 1½B Milwaukee Vertical Miller Single Pulley all Geared.
No. 3 Brown & Sharpe Vertical Miller Single Pulley all Geared.
No. 7 Becker Lincoln Type Mfg. Miller.
No. 6 Whitney Hand Miller.

RADIALS and UPRIGHT DRILLS

7' Dreses High Duty Plain Radial Gear Box Drive.
5' Dreses High Duty Plain Radial Gear Box Drive.
5' Niles-Bement-Pond Semi Universal Radial Gear Box Drive.
4' Cincinnati Bickford Plain Radial Gear Box Drive.
3' American Triple Geared Plain Radial Gear Box Drive.
No. 1 and No. 3 W. F. & John Barnes Horizontal Radials.
28" Reed Prentice Upright Drill Gear Box Drive—Tapping Attach.
28" Aurora Upright Drill.
26" W. F. & John Barnes Upright Drill.
26" Reed Prentice Upright Drill Gear Box Drive.
24" Cincinnati Bickford Upright Drill Tapping Attachments.
24" Cincinnati Bickford Upright Drill Gear Box Drive.
22" Aurora Upright Drill—Tapping Attachments.
22" W. F. & John Barnes Upright Drills.
No. 3 Avey High Speed Ball Bearing Drill.
No. 310—Baker Brothers Heavy Duty Drills.
D No. 3 Colburn Heavy Duty Drill—Tapping Attachments and Compound Table.

PLANERS and Shapers

42" x 42" x 12' G. A. Gray Planer two heads on rail.
36" x 36" x 14' American Planer two heads on rail.
26" x 26" x 8' American Planer one head on rail.
26" Smith & Mills High Duty Shaper B. G. Crank.
24" Smith & Mills B. G. Crank Shaper.
24" Hendey Friction Shaper Power Down feed to head.
20" Rockford B. G. Crank Shaper single Pulley Gear Box Drive.
20" Queen City B. G. Crank Shaper.
16" Steptoe B. G. Crank Shaper.
15" American Tool Works Crank Shaper.

ENGINE LATHES and TURRET LATHES

30" x 12' R. K. LeBlond Heavy Duty Q. C. Lathe.
24" x 10' Boye & Emmes Q. C. Lathe.
21" x 10' R. K. LeBlond Heavy Duty Q. C. Lathe.
21" x 8' R. K. LeBlond Heavy Duty Q.C. Lathe.
20" x 12' Hendey Yoke Head Q. C. Lathe with Taper Attachment.
18" x 11' Chard Heavy Duty Q. C. Lathe.
18" x 8' Lodge & Shipley Q. C. Lathe.
18" x 8' Mueller Q. C. Lathe.
16" x 8' R. K. LeBlond Q. C. Lathe with Taper Attachment.
16" x 7' Pratt & Whitney Q. C. Tool Room Lathe with Taper Attachments.
24" Gisholt Turret Lathe, Late Type, with 6¼" hole in spindle.
2" x 36" Jones & Lamson Flat Turret Lathe.
2¼" x 26" Pratt & Whitney Flat Turret Lathe.
2" Pratt & Whitney Turret Lathe.
No. 6 Warner & Swasey Turret Lathe.
No. 4 Universal Warner & Swasey Turret Lathe.
No. 4 Warner & Swasey Turret Lathe.
No. 4 Brown & Sharpe Friction Head Wire Feed Screw Machine.
No. 3 Foster Turret Lathe.

GRINDERS and GEAR MACHINERY

No. 60 Heald Cylinder Grinder, Late Type, complete.
No. 6 Rivett Internal Grinder.
No. 2—12' x 36" Cincinnati Plain Grinder.
8' x 36" Modern Plain Self Contained Grinder—95% New.
6" x 32" Norton Plain Grinder.
No. 1 and No. 2 Brown & Sharpe Universal Grinders.
No. 1 R. K. LeBlond Universal Tool and Cutter Grinder.
No. 2 Oakley Universal Tool and Cutter Grinder.
No. 3 Brown & Sharpe Universal Cutter and Reamer Grinder.
No. 5—60" Brown & Sharpe Auto Spur Gear Cutter.
No. 5A 60" Cincinnati Auto Spur Gear Cutter.
No. 3—36" Brown & Sharpe Auto Spur Gear Cutter.
24" Gould & Eberhardt Auto Spur Gear Cutter.
No. 12 Brown & Sharpe Auto Spur and Bevel Gear Cutter—cap. 12" Gears.
No. 12 Barber-Colman Gear Hobber.
18H Gould & Eberhardt Gear Hobber.

MISCELLANEOUS

No. 4 and No. 5 Greenard Arbor Presses.
15-ton Lucas Machine Tool Company's Power Forcing Presses.
1¼" Nat'l Bolt Threading Machine with Landis Die Head.
1" Landis Bolt Threading Maching with Lead Screw Attachments.
1½" Nat'l Double Spindle Bolt Threading Machine with Lead Screw Attachments.
24" Bullard Vertical Boring Mill, Rapid Production Type.
24" Colburn Vertical Boring Mill with Turret Head on rail.
No. 3 Baker Brothers Keyseater—cap. 3" Keyways.
No. 2 Toledo O.B.I. Power Press.
No. 8 Chas. Lefler O.B.I. Power Press.
No. 7—8" x 8" Atkins Kwik Kut Power Hack Saw.
No. 1 and No. 4B Cochrane & Bly Cold Saws.
30" D. H. Stoll Power Shear—cap. 14 Gauge and Lighter.
No. 2X Garvin Automatic Tapping Machine.
Federal Electric Spot Welder—cap. to weld two pieces of ¼".
No. 2 and No. 3 B. J. N. LaPointe Broaching Machines.
600 lb. Chambersburg Steam Hammer.
200 lb. Bliss Board Drop Hammer.
No. 2A and No. 4A High Speed Riveting Hammers.
16" x 14" Chicago Pneumatic Tool Co.'s Class N. S. B. Air Compressor and many others.

Send for our new list of Bargains.

The Eastern Machinery Company
408 E. Pearl Street Cincinnati, Ohio

INDUSTRIAL MACHINERY CORP.
147 Provost St., Jersey City, N.J.

20—6A
Potter & Johnston AUTOMATICS
17,000 Serial.

1—6 Ft. Gould & Eberhardt Rack Cutter.

1—Brown & Sharpe No. 4-48" Gear Cutter.
1—Lees Bradner Gear Generator No. 5A.
2—No. 18HM Gould & Eberhardt Gear Hobbers.
1—No. 36 BM Gould & Eberhardt Gear Ruffer.
1—No. 65 Fellows Gear Shaper.
2—4½" x 12" Pratt & Whitney Thread Millers.
1—No. 2 Rockford Plain Miller.
1—16" x 48" Landis Crank Shaft Grinder.
1—16" x 36" Landis Plain Grinder.
1—1¼" Gridley Automatic Mult. Sp.
1—20" x 10' American Lathe.
1—30" x 10' American Lathe.
1—12" x 6' Willard Lathe.
1—Ingle Tooth Rounder.
3"-11"-18" Gleason Generators.
All Sizes Acme Screw Machines.

Send us your inquiries and list of surplus equipment.

A Few Particular Bargains Out of Our Large Stock of Slightly Used Machinery

1—No. 35 Ohio Universal Milling Machine.
1—No. 2B Hendey Norton Universal Milling Machine.
1—No. 2 Brown & Sharpe Universal Milling
1—No. 3 Avey Drill Press. B.B. 1¼" cap.
2—20" Foote-Burt All Geared Drill Presses.
1—No. 1 Brown & Sharpe Universal Grinder.
1—20"x8' Mueller Lathe. D.B.G.
1—17"x6' LeBlond Heavy Duty Lathe. D.B.G. Machine.
1—14"x6' Davis Tool Room Lathe. T.A.
1—15" Potter & Johnson Universal Shaper.
1—No. 66 V. & O. Power Press. S.S. B.G.
B. & S., Gridley and Cleveland Automatics.
Gear Cutters and Hobbers.
Over 200 other bargains in stock.

Jansson Machinery Exchange
CANal 0688 231 Centre Street
New York City

PIPE MACHINE

6" Cox, capacity 2½" to 6" inclusive with individual die heads and latest type cutting from 2½" to 6" inclusive.

DELTA EQUIPMENT CO.
148 N. Third St. Philadelphia, Pa.

Miscellaneous

12x14 Chicago Belt Driven Air Compressor, with 50 H.P. Motor
Pond 72" Boring Mill
Bullard 42" Boring Mill
Weigel 24" B. G. Drill
Baush 5' Radial Drill
Niles Hor. Boring, Drilling and Milling Machne, 5" bar
Little Giant 100 lb. Hammer
Bradley 25 & 40 lb. Helve Hammers
Bement 800 lb. Steam Forging; 2000 lb. Steam Drop Hammers
Gisholt Turret Lathe 24"x6'
Libby 18" High Power Turret Lathe
Jones & Lamson 3x36" Flat Turret Lathes
Lodge & Shipley 14"x6' q.c.g.
Lodge & Shipley 22"x10' Lathe
Johnson 24" x 16½' Lathe
Walcott Lathe 26"x10' 6", q.c.g.
Pond Triple Geared Lathe 42"x30'
Brown & Sharpe No. 5 Plain Miller
Dbl. Acting Drawing Press, 3¼" Str.
Dbl. Cam Action Press 4" Stroke
Cleveland Style "C" S.E. Punch and Shear, 24" throat; Cap. 1" thru ½"
Atkins Power Hack Saw 6"
Cincinnati 24" B. G. Crank Shaper
Steptoe 20" B. G. Crank Shaper
20" Cincinnati B. G. Shaper
Ewert & Kutscheid 10' Squaring Shear, No. 10 Gauge with Motor, 3 ph., 60 cyc., 220 volts
Niagara 72" Power Sq. Shear, Cap. 14 gauge
Ajax "New Model" Size A-12 Reclaiming Rolling Mill for re-rolling Scrap Bars and Small Billets
No. 5 H. & J. Angle Shear 8"x8"x1¼"
Gliem Cold Saw, 22" saw, cap. 6"

Russell Machine Company
Pittsburgh, Pa.

Ogden R. Adams Co.,
INC.
Rochester, N. Y.

Two No. 2 Murchey Semi-Automatic Nipple and Pipe Threading Machines; capacity ½" to 2"; complete with chamfering tools, oil pump, piping and tank, die head and chasers, countershaft; price (each) $500.00, F.O.B. Rochester, N. Y.

Good Accurate Tool at a Bargain

30"x30"x16' G. A. Gray Planer, 2 hds. on rail. spiral drive, rebuilt and tested at G. A. Gray Co. factory and guaranteed accurate. Price 2000.
18"x96" Norton Grinder, in good order and with one brand new wheel, $900.
200 Other Good Tools.

Norton-Broadway Machinery Co.
Cincinnati, Ohio

NEW AND USED MACHINE TOOLS

NEW

—Betts 26" x 16' C. D. or G. H. Lathes
—Betts Center Drive Axle Lathe
—Betts 52" Car Wheel Borer
—Betts 26" x 18' C. D. or G. H. Lathe
—Betts 8" Slotter
—Betts 10" Slotters
—Betts 12" Tooth Rounders
—Betts 30" Tooth Rounders
—Colburn No. 2 Single Spindle Drill Press
—Colburn D-4 Heavy Duty Drill Press
—Colburn Rod Boring Machine
—Colburn 48", 2 Swivel Heads, Std. Boring Mill
—Colburn 48" Heavy Duty Boring Mill, 2 swivel heads
—Colburn No. 14 Std. Type Drill Presses
—Colburn 54" Std. Boring Mill
—Colburn 60" Std. Boring Mills
—Colburn 72" Std. Boring Mills
—Newton 10" Crank Slotters
—Newton 12" Crank Slotters
—Newton Radius Link Grinders
—Newton 24" Vertical Milling Machine (automatic)
—Newton Double Spindle Milling Machine (spring pads on axles)
—Newton Special Cam Feed Milling Machine (Generator pads on crank cases)
—Newton 30½" Crank Planers
—Newton 20" Cold Saws (U-33)
—Newton 48" Bar Saw (U-85)
—Modern No. 3 Universal Grinders
—Modern 8 x 18 Grinders
—Modern 8 x 30 Grinders
—Modern 13 x 48 Grinders
—Hilles & Jones No. 4—80" Plate Straightening Rolls, 1" capacity
—Cleveland 36" Sliding Head Drill with T. A.
—Cleveland 28" Sliding Head Drill
—Cleveland 32" Sliding Head Drill
—Grand Rapids Drill Grinder No. B-2T, ⅛ to 1½"
—Fox No. 1A Horizontal Millers
—Webster & Perks No. ⅜ Grinder and Ctsf.
—Gorton 26" x 30" x 8' Planer—2 Rail heads
—Hilles & Jones No. 4—128" Plate Straightening Rolls, ¾" capacity
—Hilles & Jones Single Punch, 60" throat, capacity 1¼" x 1"

USED TOOLS at Attractive Prices

USED

1—Cleveland Automatic, 2¼" Bar Capacity
1—Hendey Cone Drive Lathe, 14" x 10'
1—LaPointe No. 3 Keyseater
1—Norton Emery Wheel Stand
1—Amer. Separator (Chip)
1—Automatic Saw Grinder
1—Garvin Special Grinder
1—Special Grinder for Tools on Gleason Generator
1—Wells Tool Grinder
1—Oster Pipe Threading Machine
1—Foote-Burt No. 17 Four Spindle Rail Type Drilling Machine
1—Baker Keyseater, cap. 50"
1—Aurora Drill Press—Table 20"
1—Sellers Drill Grinder
1—Barnes Emery Wheel
1—Whiton Centering Machine, 4" cap.
1—Newton Horiz. Boring and Milling Machine, 4" Bar
1—West. Elec. Emery Wheel Stand with Motor, 20" Wheel
1—Davis Chucking Machine, 24" cap.
1—No. 3 Kempsmith Milling Machine
1—Whitcomb Planer, 22" x 28" x 6", Motor Drive, Single Hd.
1—Flather Planer, 24" x 28" x 6'
1—Fitchburg Planer, 42" x 42" x 14', 3 heads
1—No. 1 Van Norman Hand Miller
1—Schumacher & Boye 36" x 14' Cone Drive Lathe
1—Johnston 36" x 18' Cone Drive Lathe with triple Gear
1—American Planer, 24" x 26" x 6', Single Head
1—Whitcomb & Blaisdell Planer, 24" x 24" x 8', Two Heads
1—Pond Planer, 44" x 25', 2 hds. on rail, and 2 side heads
1—Colburn Boring Mill 34" turret hd. and threading attachment
1—Fitchburg Cone Drive Floor Borer, 3" Spindle
1—Cleveland Automatic Mach. Bar, cap. 2¼"
1—American Cone Drive Lathe, 20" x 8'
1—Napier Saw, 9"
1—Atkins Saw, 9" cap.
1—Woodward & Powell 28" Planer, Table 24" x 24" x 8', Single Head
1—Warner & Swasey 2¼" Turret Lathe
4—Greenerd Arbor Presses, No. 7
1—Gould & Eberhardt Automatic Gear Cutter, cap. 32"
1—Gooley & Eglund Milling Machine, cap. 8"
1—Pond 26" x 22' Cone Drive, Triple Gear Lathe
1—Fellows Stand. Gear Cutter
1—Sibley Emery Wheel Stand
1—Gardner Disc Grinder
1—Screw Slotting Machine
1—Wood Saw and Table
1—Bridgeport Safety Emery Wheel, No. 24
1—Johnston 16" x 14' Lathe, not complete
1—Gould & Eberhardt 48" Rotary Gear Cutter
1—Gould & Eberhardt 30" Rotary Gear Cutter
1—Gleason 6" Generator, Motor Drive
1—Gleason 18" Gear Planer, Motor Drive
1—Gleason 15" Generator, Motor Drive
1—Gleason 18" Gear Planer, Belt Drive
1—Gleason 16" Gear Planer, Belt Drive
1—Greenfield 12" x 48" Bench Lathe
1—Hilles & Jones No. 5 Pyramid Type 10' Bending Rolls
1—Newton Vertical Continuous Miller—36" table—2 spindles
1—Newton 48" Rotary Milling Machine
1—Newton 42" Verticle Rotary Milling Machine
1—Newton 60" Vertical Rotary Milling Machine
1—Notts 4 Carriage Journal Truing Lathe
1—H. & J. No. 5 Double Angle Shear on turntable 8 x 8 x 1¼"
1—H. & J. No. 2 Single Punch, 11" throat, 1" through 1"
1—No. 6 Cleveland Bar Shear arranged for motor drive

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1—16 x 8 3-Step D.B.G. T/R L. & S. Lathe.
1—18 x 6 Selective Hd. Mfg. L. & S. Lathe.
1—18 x 10 Selective Mfg. L. & S. Lathe.
1—20 x 12 3-Step D.B.G. T/R L. & S. Lathe.
1—24 x 12 4-Step L. & S. Turret Lathe.
1—22 x 10 (30" swing) L. & S. Pat. H. Chucking Lathe.
2—22 x 10 Pat. Hd. L. & S. Chucking Lathes.
2—24 x 8 4-step, D.B.G. L. & S. Turret Lathes.
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1—Cincinnati No. 4 Plain Milling Machine, 3-Step Cone, D.B.G., with all power feeds.
1—Cincinnati No. 4 Plain Milling Machine, 4-Step Cone, Single Back Geared Drive, with all power feeds.
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1—4' Plain No. 1 Cincinnati-Bickford Radial Drill with six speed box.
1—3 H.P., 1150 R.P.M., 220 Volt D.C. Reliance Motor.
1—24" x 6' Gray Planer with one head.

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36" Bullard vertical with turret head and side head, 3 jaw chuck table, single pulley drive.
Lucas Horizontal, 3" bar.
Universal Horizontal, 2½" bar.
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2' American Radial.
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24" Baker heavy duty.
Harrington 24 spindle, rect. head.
20" to 36" Upright.
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12" to 32".
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No. 2 W. & S. Hol. Hex.
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Good Second Hand Machines

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1½", 2¼" & 3¾" Acme
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24" Bullard Vertical, New Era
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14" x 6 ft. Hendey
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20" x 8 ft. Lodge & Shipley
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30" x 12 ft. Lodge & Shipley
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30" x 22 ft. Lodge & Shipley (Heavy Forge Type)
26"—44" x 16 ft. McCabe, double spindle
DRILLS
10 spindle Fox Multiple
No. 13 Natco Multiple
4 spindle Foote-Burt Multiple No. 17
3 & 4 spindle Barnes Multiple
1 spindle Baker Bros. Heavy Duty
24 "& 32" Cincinnati Upright
24" & 28" Cincinnati Upright
36" Blaisdell Upright
3 ft. American Radial
4 ft. Bickford Radial
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6" x 32" Norton Plain
10" x 36" & 72" Norton Plain
10" x 20" & 36" Landis Plain
12" x 36" Cincinnati Universal
12" x 36" Landis Universal
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No. 16 Blanchard Surface
14" Pratt & Whitney Surface
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Nos. 1, 2 & 3 Brown & Sharpe Plain
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"Satisfaction Guaranteed or Money Refunded"

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12" x 72" Norton Plain Cylindrical Grinder.
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No. 6 Gardner 26" Disc Grinder.
3' Fosdick Plain Radial Drill, Gear Box.
5' Reed-Prentice Radial, latest type.
7' Cincinnati-Bickford Plain Radial Drill.
Allen Single Spindle Drill.
24" Aurora Sliding Head Drill
36" x 30" x 10' Newton Slab Miller.

No. 2-M Potter & Johnson Automatic Millers.

No. 5 B Brown & Sharpe Plain Miller.
No. 3 Becker Vertical Miller, Belt Driven.
No. 2½ LeBlond Plain Miller, like new.
No. 1 Cleveland Plain Miller S.P.D.
24" Brown & Sharpe Gear Cutter.
37" Bullard Vertical Boring Mill.
42" Bullard Vertical Boring Mills.
No. 2 Foster Screw Machine.
28" Gisholt Turret Lathe, Belt Driven.
13" x 21" x 8' Star Gap Lathe, Belt Drive.
24" x 14' Reed-Prentice Grd. Hd. Lathe.
25" x 12' LeBlond Q.C.G. Lathes (3).
46" x 16' New Haven Engine Lathe.
60" x 21' Sellers Triple Geared Lathe.
No. 3 B LaPointe Broaching Machine.

16" Gould & Eberhardt High Duty Shaper, like new—Serial No. 11809.

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47" x 16' 0" table, vertical and horizontal power feeds. All in good operating condition.

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1—No. 2 Bliss Stiles Power Press.
1—Large Waterbury F. F. & Machine Co. Open Back Geared Power Press, 4" stroke, weight 5 tons.
2—Waterbury F. F. & Machine Co. 20 Ton Back and Pinion Presses.
1—300 lb. Standard Machinery Co. Automatic Drop.
1—350 lb. Standard Machinery Co. Plain Drop.

ROLLING MILLS

1— 4 x 6 Rolling Mill.
1— 5 x 5 Rolling Mill.
1— 8 x 12 Rolling Mill.
1—16 x 20 Rolling Mill.

MISCELLANEOUS

1—No. 2 Pawtucket Mfg. Co. Screw Shaving Machine.
1—50 lb. Sturtevant Plate Blower.
1—60 lb. Sturtevant Plate Blower.
1—Gray Planer 24"x24"x8'.
1—New Haven Planer 28"x28"x8'.
1—No. 14 Brown & Sharpe Plain Grinder.
1—No. 2 Brown & Sharpe Automatic Screw Machine.
1—Diamond Knife Grinder.
1—Springfield Brandes Vertical Grinder 12"x16"x84".
1—Cooley & Ediund Milling Machine.
1—No. 3 Garvin Plain Milling Machine.
2—No. 23 Garvin Hand Screw Machines.
1—2½ Garvin Hand Screw Machine, Back Geared Wire Feed.
1—3" x 36" Jones & Lamson Turret Lathe, both Bar and Chucking Equipment.
12—Bullard Turret Lathes.
1—18" Prentice Chucking Lathe.
1—No. 2 Baird Tilting Tumbler.
1—No. 3 Garvin Horizontal Tapping Machine.
1—9 x 9 West Haven Hack Saw, Motor Driven.
1—4 Spindle Taylor & Penn Drill.
2—14 x 6 Prentice Geared Head Lathes.
1—18 x 8 Whitcomb Blaisdell Lathe, Quick Change Gear.
2—16 x 6 Prentice Lathes, Quick Change Gear, Cone Drive.
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Compressors, 9" x 8" and 12" x 10", new.
Drills, 1, 2 and 3 spindle Sensitive and High Speed.
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Grinder, 6" x 15" Fitchburg, plain.
Grinder, 12" x 36" Cincinnati Universal.
Grinder, 16" x 48" Landis Universal.
Lathe, 14" x 6' Sebastian, geared head, motor drive.
Lathe, 18" x 10' American quick change.
Lathe, Hamilton, new model Rapid Production, swing 20" x 10'.
Lathe, 24" x 12' Bradford.
Milling Machine, B. & S. No. 2 heavy.
Milling Machine No. 3 Cincinnati Universal
Miller, No. 1 B. & S. Universal.
Miller, Kempsmith No. 1 and No. 3 Universal.
Miller, No. 2 and No. 3 Kempsmith, plain.
Pipe Machine, 2", 4", 6".
Presses, No. 3-A and No. 6-A Willard.
Presses, Nos. 1, 1½, 2 and 4, Robinson.
Punch and Shear, ½" x ½", 10" throat.
Radial Drill 3' W. E. Gang cone drive.
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Screw Machine, Milholland 1" and 1½".
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Shaper, 16" American tool room.
Shaper, 16" O. & S., new.
Shaper 16" Cincinnati motor drive.
24" Gould & Eberhardt cone drive.
Shear, square 60" Pexto, 18 gauge.
Shear, No. 20 Quickwork, 14 gauge, 30" throat.
Shear, No. 13 Pettingell, 60" throat.

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One 1½" Capacity Vertical 100-Ton Hydraulic Boiler Riveting Machine

10'-6" throat with 12 ton hydraulic overhead crane and 1" steel hoisting chain, hand lever control valve, accumulator with weights, piping, etc.

All in Good Operating Condition.

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1—14"x6' Lodge & Shipley.
1—16"x8' Bradford, with Taper.
1—18"x12' South Bend, with Taper.
1—18"x8' Bradford Raising Blocks.
5—21"x10' LeBlond Mfg.
1—14"x6' Monarch Lathe.

DRILL PRESSES

6—16" Sipp Sensitive.
1—24" Weigel B.G.
1—36" Cincinnati, Tapping Att.
3—16" 2 Spindle Henry & Wright.
2—14" 2 Spindle LeLand & Gifford.
1—20" 2 Spindle Colburn Gang No. 2.
2—No. 1 Baush Multiple 8 Spindle.
1—No. 2 Fox Rail.

HOLE HOGS

1—No. 5D Moline 4 CW 32 Heads.
1—Twin 8 Spindle Moline Rail Drill.

GRINDERS

1—No. 14 Brown & Sharpe Plain.
1—No. 3 Brown & Sharpe Univ.
1—No. 2 Cincinnati Plain.
1—No. 4 Van Norman Internal.
1—No. 85 Heald Internal.
1—30" Diamond Face Grinder.
1—15A Bryant Chucking and Face.
1—No. 1½ Cincinnati Tool and Cutter.

MISCELLANEOUS

1—84" Dia. Newton Rotary Miller.
1—No 4 Cincinnati Vertical Miller, S.P.D. Quick Return Traverse.
1—No. 0 Brown & Sharpe Screw Machine.
4—No. 4 Warner & Swasey Screw Machines M.D.
1—400 Lb. Billings & Spencer Board Drop Hammer.
1—24" Cincinnati Shaper.
1—No. 3½ Pratt & Whitney Duplex Miller.
1—No. 3 Brown & Sharpe Universal Miller comp.
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1—20" Whipp B.G. Shaper.
1—9x9 Peerless Hack Saw, M.D.
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Guaranteed Cincinnati Acme Turret Machinery

7—1 in. x 7 in. plain head screw machines with power feed to turret.

1—14 in. plain head turret lathe with pan and pump and power feed to turret, also 9 in. Barker wrenchless chuck.

3—1½ in. x 9 in. friction back geared screw machines with power feed to turret.

1—18 in. friction back geared turret lathe with pan and pump and power feed to turret and 8 in. 2-jaw Hannifin air chuck equipment.

1—2¼ in. x 26 in. friction back geared cone head flat turret lathe with equipment for bar work.

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NOTE—Screw machine equipment includes automatic chuck, one collet, stock feed, pan, pump and piping and countershaft. Prices f.o.b. Cincinnati.

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14'-20' Betts Extension Type Two swivel heads—Belt drive. Low price before removal.

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No. 4 Verdin, K. Verdin, Inc., geared press.
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76"x96"x24' Detrick & Harvey Open S planer.
48" Gleason bevel gear planer.
24" Gleason bevel gear planer.
Bolt threader, Landis 1½" double spindle, with lead screws.
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Wheel press, 300 tons complete.
Gray Planer, 30"x30"x12', two heads.
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1—4' Hammond, tapping attachment. Rebuilt	575

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MISCELLANEOUS

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Boring Mill, No. 44 D. & H. Horiz., 3¼" Bar.
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Lathe, 14" x 6' Hendey Geared Head, M.D.
Lathe, 18" x 10' Whitcomb-Blaisdell, G.H., S.P.D.
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Miller, No. 2 Brown & Sharpe Universal.
Miller, No. 3 Cincinnati Universal.
Miller, Model "C" Becker, S.P.D.
Press, 15 Ton Lucas Forcing.
Press, 30 Ton Lucas Forcing.
Press, No. 54 Toledo Trimming.
Press, No. 1½ Bliss Toggle Drawing.
Radial Drill, 5' American Plain, T.A., M.D.
Radial Drill, 6' American Plain, T.A., B.D.
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Shaper, 30" Steptoe Back Geared Crank.
Turret Lathe, 24" Steinle, 6¼" Hole.

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No. 75 open back geared press, motor drive, bed 14 x 24, stroke 3".

No. 73½ straight side press, flywheel type, between housings 18", stroke 3".

Thirty other presses in stock.

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Saturday, October 16, 1926, at 10 A.M. at 2110 Allen Ave., S.E., Canton, Ohio, I will sell at public auction the real estate, about 3 acres, buildings, machinery and equipment of the above named Company consisting in part of the following: Forging presses and hammer, trimming presses and shear, machine shop equipment, air compressors, air blower, oil pump, heat-treating, tumbling, pickling, dies, tools and other equipment.

Will be offered as an entirety also in separate items, lots or combinations.

William H. Lehman, Receiver
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HILLES & JONES MACHINERY
DOUBLE ANGLE SHEARS
No. 5—8 x 8 x 1¼ on turntable.
No. 3—6 x 6 x 1.
PLATE EDGE PLANER
Overhead Motor Drive, 32' cut, 1" plate.
PLATE STRAIGHTENING ROLLS
56" between housings for 1" plate.
DELAWARE ELECTRIC & SUPPLY CO.
Wilmington, Delaware

1—CLEVELAND NO. 4 DOUBLE ANGLE SHEAR, CAPACITY 8 x 8 x 1"—MOTOR DRIVE, 10 H.P.—220 VOLT D.C.

1—10-TON MILWAUKEE TROLLEY—SEVEN FOOT GAUGE—MAIN HOIST MOTOR 27 H.P. RACK MOTOR 4 H.P. 220 VOLT—D.C.

SCULLY-JONES & CO.
2012 W. Thirteenth St., Chicago, Ill.

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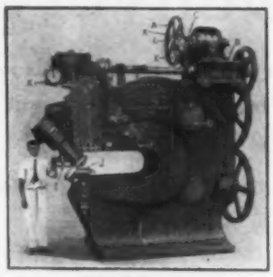

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2—No. 60A, 1" cutting capacity, 48" throat, 3 speeds, each. **$3,300**

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1—No. 60A, 1" cutting capacity, 48" throat, 3 speeds. Thoroughly rebuilt and fully guaranteed **$2,200**

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THE QUICKWORK COMPANY
St. Marys, Ohio

We Specialize in Rebuilt Bradley Helve Hammers. We completely rebuild these hammers, new helves and rubber cushions where required, rebabbitt the eccentrics, etc. Each hammer equal to 85% new.

1—60-lb. Hexagon Base Cushion Helve Hammer	$325.00
3—60-lb. Adjustable Base Cushion Helve Hammers ea.	450.00
1—80-lb. Adjustable Base Cushion Helve Hammer	575.00
1—100-lb. Upright Strap Hammer	425.00
1—100-lb. Compact Hammer	425.00

We also have several other makes and would like to know just what you need. May we send photos and other data?

J. L. LUCAS & SON, INC.
3 Fox St. Bridgeport, Conn.

8'x⅜" N.-B.-P. Bending Rolls. Drop End.
No. 1½ Bliss Toggle Press.
6' Prentice Radial Drill. S.P.D.
10"x10" Ingersoll Air Compressor. 150 cu. ft.
20" Cincinnati Shaper. Belt Drive.
Riveter, Allen 66", 1¼" capacity.
200 lb. Beaudry Upright Power Hammer.
50 lb. Mayer Power Hammer.

Fitzsimmons & Cole Machinery Co.
1208 House Bldg., Pittsburgh, Pa.

Electric Melting Furnace

Heroult Arc Type.
Built by American Bridge Co.
One Ton Capacity.
Three Single Phase Transformers.
125 KVA each (Westinghouse).
Primary 12000 volts, 3 phase, 60 cycles.
Excellent Condition.

TROJAN ELECTRIC STEEL CO.
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FOR SALE: Available for shipment late this year on completion of work.

Complete stone crushing plant

producing 600 tons daily. Can be seen in operation at Buffalo, N. Y.

Frank L. Cohen, Inc.
Prudential Building, Buffalo, New York

We specialize in
ELECTRIC WELDERS
LIFTING MAGNETS
Electric Mono-Rail Hoists

In addition to furnishing you with these machines, we offer you a reliable engineering service.

We buy, sell, exchange, rent and repair these machines.

GOODMAN ELECTRIC MACHINERY CO.
126 Green St. Newark, N. J.

We offer Rebuilt and fully guaranteed THOMPSON or TOLEDO SPOT and BUTT Welders, Hand Operated, Automatic or Power Driven.

We have a complete line for immediate delivery at very low prices.

What are your requirements?

Taylor-Hall Welding Corporation
1 May St., Worcester, Mass.

FOR SALE

1—500 lb. capacity Type-O American Fenneifelt Electric Arch Furnace for 550 Volt, 3 phase, 60 Cycle Alternating Current.

1—Steam Driven Generator Consisting of 175 H.P. Harrisburg Tandem Compound Engine—Direct Connected to 100 KW—800 Amp. 125 Volt Westinghouse D.C. generator.

1—600 Volt—3 Phase—60 Cycle—998 Amp. —310 KW. revolving field type alternating current generator direct connected between 2 Diesel Engines each Triple Cylinder Unit (16"x24") 10 ft. Dia. Flywheel, 225 Brake H.P. Diesel engines complete with air compressors and starting bottles.

Gorham Manufacturing Co.
Providence, R. I.

FOR SALE

Bates Vertical Automatic Non Condensing Simple High Speed Engine size 14 x 14, 275 R. P. M., 210 I. H. P., 140 lbs. steam pressure ¼ cut-off, built by Bates Machine Co., Joliet, Ill. Shop No. 253,

direct connected with

Allis Chalmers Dynamo No. 40006, volts 240, amps. 265, phase 3, frequency 60, R. P. M. 277.

Will be sold at a low price.

BERNHARD STERN & SONS
315 Court Street,
Milwaukee, Wisconsin

Blowers Compressors Exhausters

Large Stock for all purposes, also Air Receivers, Tanks, Molding Machines and Foundry Equipment.

Pneumatic and General Machinery Dealers.

Send Specifications for your needs.

Clifton Pratt Co., 1224 W. 8th St., Cincinnati, Ohio

1—Style 6 M C Hydraulic

Scrap Metal Compress

with charging box 62 x 30 x 24", producing Bales 22 x 12 x 12", and upwards. Estimated capacity 3 tons, compressed copper or brass per hour.

United States Metals Refining Co., Carteret, Middlesex Co., N. J.

Valley Mould & Iron Corporation

Sharpsville, Pa.

We offer the following at very attractive prices for *quick sale:*

1—42 x 84 x 60" Steam blowing engine with double balance wheels made by Wm. Todd Co.
1—70 x 84 x 60" Steam blowing engine with double balance wheels made by Wm. Todd Co.
1—42 x 84 x 54" Steam blowing engine with double balance wheels made by American Shipbuilding Co.
1—21 x 16 x 24 Ingersoll-Rand Horizontal double side crank steam driven air compressor.
1—3⅛ to 5" cap. Harris system automatic air switch made by Pneumatic Engineering Co.
1—11 x 13 x 16" Horizontal steam driven Weiss air pump made by Southwark Foundry & Machine Co.
3—90 K.W. Steam driven motor generator sets.
1—No. 1174 Fairbanks suspension charging scales—4 brass beams.
1—75 HP., 230 V., 272 Amp., 625 r.p.m. Type RC37, Form A compound wound General Electric Motor No. 923694 with E.C. & M. magnetic switch.
1—5¼ x 3⅛ x 5" Epping-Carpenter horizontal duplex steam pump No. 10293.
1—20" bore x 24" stroke steam end 12 x 24" water end Epping-Carpenter steam pump.
1—No. 24025—14 x 14 x 18" Duplex steam pump made by Snider-Hughes Co.
1—No. 1272—Steam pump 14" bore x 18" stroke steam end, 14 x 18" water end.
1—469 H.P. type B—16-22' 0" single vertical Rust water tube boiler—Babcock & Wilcox Co. makers—working pressure 150 lbs. per square inch.
1—78" x 150' Riveted Steel Stack.
2—588 H.P. type B—20-22' 0" single vertical Rust water tube boilers—made by Babcock-Wilcox Co.—working pressure 150 lbs. per square inch.
1—72" x 150' Riveted Steel Stack.
1—Marion Steam Shovel, model 36, mounted on railroad trucks, 1½ yd. cap.
1—Ohio Locomotive Crane—20 tons capacity.
1—125 H.P. Portable Boiler—made by Penna. Boiler Works.
2—12 x 20 x 12 x 14 Horizontal steam driven Bury Air Compressor.
1—72" Sellers Planer with friction escapement—25' bed, 4 cutting heads—belt driven.

FOR SALE

Nordberg Cross Compound Corliss Engine

grooved for 25 1¼ in. rope. Shop No. 19594. This engine was built in 1906 and, having received excellent care, is in splendid condition.

1 Nordberg Manufacturing Co. Milwaukee, 28 in. x 48 in. special belt driven crank and fly-wheel type, jet condenser, air pump and boiler feed pump 32 in. x 15 in. solid rim iron fly wheel, with special 42 in. by 24 in. x 48 in. galvanized iron tank, in angle iron frame. Shop No. 19596.

The above will be sold at a sacrifice price.

BERNHARD STERN & SONS
315 Court Street,
Milwaukee, Wis.

AIR COMPRESSOR

1170 cu. ft. Chgo-Pneu. OCB, latest type, 20x12x14, complete. 200 HP. Gen. Elec. Slip Ring Motor. 3 ph., 60 cyc., 2200 volts, complete.

Special price before removal

A. G. SCHOONMAKER & SONS, Inc.
30 Church Street New York City

COMPRESSOR

1190' Ing.-Rand—Belt Drive with Receiver and Aftercooler.

CRANE

Browning Locomotive Crane—20 ton—8 wheel—50' boom.

J. T. WALSH
500 Brisbane Bldg., Buffalo, N. Y.

2500 cu. ft. Allis Chalmers Air Compressor, 100 lbs. pressure. Synchronous motor drive. Condition A-1.

N. C. FAILOR CO., INC.
30 Church St., New York, N. Y.

COMPRESSORS

2—12 x 10 Ingersoll-Rand ER1.
1—10 x 8 Ingersoll-Rand ER1.
1—22-13 x 16 Chicago Pneumatic.
2—14 x 12 x 12 Ingersoll-Rand FR1.
1—Chicago Pneumatic Duplex Steam, 14 x 16, two-stage air 22-13 x 16. ALL PLATE VAVLE MACHINES.
1—18 x 18 and 11 x 18 Laidlaw-Dunn-Gordon.
1—12 x 12¼ x 12 Ingersoll-Rand NF1.
1—12¼ x 12 Ingersoll-Rand E.

MARVIN BRIGGS, Inc.
167 Sixth St. Brooklyn, N. Y.

Locomotive Boiler

125 H. P. Locomotive Portable Boiler ASME Code, 125-lbs. Pressure.

Generator Set

125 K.W., 220 volt, 3 phase, 60 cycle, General Electric Revolving Field type TRE Generator, direct connected to Harrisburg engine.

Large stock Engines, Boilers, Pumps and Electric Machinery. Send for list.

THE O'BRIEN MACHINERY COMPANY
113 North Third St., Philadelphia, Pa.
Long Distance Telephone: Market 0727
Cable Address: "OBRIEN" PHILADELPHIA

4—400-hp. Erie City Vertical Water Tube Boilers built according to A.S.M.E. code.

1—50-hp. Erie Economic Boiler, A.S.M.E.

READING ENGINEERING WORKS
32 N. Second St., Reading, Pa.

2---New 1001 H.P. BOILERS (200 Lb.)

Asme Code. Never erected. Recently received from Factory.

ADDRESS BOX 133-D
care *The Iron Age*, Otis Bldg., Chicago, Ill.

Babcock—BOILERS—Wilcox
built for 200 lbs. pressure

(2) 400 H.P. (each) set in battery, 16 sections wide, 12 tubes high, 192—4" x 18' tubes.
(1) 267 H.P. 14 sections wide, 9 tubes high. 126—4" x 18' tubes.

Forged steel mud drums with above boilers.

H. P. BREARLEY
90 West Street New York City

BOILERS—ENGINES, Oil and Steam
GENERATORS, A.C. and D.C.
MOTORS, A.C. and D.C.
WATER WHEELS—TRANSFORMERS
COMPRESSORS, AIR
OVERHEAD CRANES
LOCOMOTIVE CRANES
STEAMSHOVELS—STEEL BUILDINGS

Hooper-Momberger Co.
90 West St., New York

ECONOMIC BOILERS

3—80-hp. Erie City Economic Boilers. Size 12, A.S.M.E., 125 lb. pressure, complete with all fittings. Installed in 1924 and used about six months.

MOORE & MacDONALD
26 Cortlandt St., New York, N. Y.

Complete Power Plant in first class operating condition for sale,

Consisting of the following:

4—400 H.P. Sterling boilers, with Murphy stokers. 174 lbs. pressure. Price $5.00 H.P.
2—300 H.P. Sterling boilers, with Rooney stokers. 174 lbs. pressure. Price $5.00 H.P.
2—Heavy duty Corliss engines. Cooper make. Tandem compound. 18 and 36 x 42. One right hand, and one left hand. 16 foot balance wheel. Price each $2500.
1—Westinghouse Turbine Generator Outfit. 1670 KVA., 6600 Volts, 3 Phase, 25 Cycle, 1500 R.P.M., 146 Amp. per terminal. Complete with condenser. Price $5000.
1—Westinghouse Turbine and Generator. 50 KW., 125 Volts. Price $500.
2—1230 foot Wheeler surface condensers, with pump. Price each $1000.
2—General Electric rotary converters. 360 KW., 600 Volts, direct current, side 25 Cycle, alternating current. Price each $750.
6—Westinghouse transformers. 500 KVA., 13,200 to 6600, 25 Cycle. Price $300 each.
About 1200 feet 20" Cast Iron Water Pipe. Flanged on both ends. Price per net ton $60.
1—14" pipe connection, Centrifugal Pump. Price $500.
1—L.D.G., outside packed Duplex Pump, 8 x 5 x 10. Price $300.
2—Worthington outside packed Duplex Pumps, 14 x 8½ x 15. Price $750 each.
Large lot of high pressure pipe, valves, and fittings from 2" to 20". Prices on application.
All the above located at Painesville, Ohio. For further information write to

THE REGENT STEEL CO.
E. 80th and Bessemer Ave.
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We Offer for Sale

Power House Equipment

5—823 H.P. Babcock & Wilcox Stirling Water Tube Boilers, 200 lbs. pressure, Class M-30.
6—400 H.P. Wickes Vertical Water Tube Boilers with Murphy furnaces. pressure 160 lbs.
2—300 H.P. Vogt Straight Tube Water Tube Boilers, 160 lbs. pressure.
2—80 H.P. Horizontal Fire Tube Boilers 60" dia. x 16' long, 125 lbs. pressure.
1—Allis-Chalmers No. 5 High Vacuum Vertical Jet Condenser, complete with automatic vacuum breaker, pump, turbine and gear reduction.
2—Schutte & Koerting Low Level Multi-jet Condensers, No. 39.
1—No. 2 Schutte & Koerting Oil Cooler.
3—Webster Class B Open Feed Water Heater, Purifier and Filters, cap 11,000 B.H.P. per hour.
3—Patterson Closed Instantaneous Hot Water Heaters, Type D, cap, 8,000,000 B.T.U. per hour.
5—Patterson Closed Instantaneous, Hot Water Heaters, Type D, Capacity 30,000,000 B. T. U. per hour.
7—Size 00 Whitlock American Type A Instantaneous Hot Water Heaters.
5—Size 0 Whitlock American Type A Instantaneous Hot Water Heaters.
18—Size 1 Whitlock American Type A Instantaneous Hot Water Heaters.
1—Size 18 Whitlock American Type A Feed Water Heaters.
15—Whitlock American Type K Storage Water Heaters, No. 16, 860 gal. cap.
12—Whitlock American Type K Storage Water Heaters, No. 17, 1000 gal. cap.
1—8" Cochrane Horizontal Live Steam Receiver Separator, figure 7, Standard.
1—Steel Smoke Stack, guyed, 30" dia. x 32' high, with 4' base, 3/16" plate.

Also compressors, pipe, valves and fittings, steam pumps, centrifugal pumps, etc.

Write for General Equipment Catalogue No. 24.

Nashville Industrial Corporation
Old Hickory, Tenn.

BOILERS

Four—84" x 20' 0" H.R.T. built by Ames Iron Works, 1915-16, 250 rated, H.P. hand fired—complete with fronts, grates, suspension loops, stop check and blow-off valves.

CAMDEN FORGE CO.
Camden, New Jersey

1—250 HP Vertical Wicks Water Tube Boiler

in good condition, and equipped with a Huber Hand Stoker which was installed in 1925. For further information apply to

DEPPEN MFG. CO.
341 N. 3rd St. Reading, Pa.

BOILERS

At Bargain Prices

Horizontal Return Tubular

3—334 H.P.—ASME 84"x20'0" 125 to 150 lbs. Pressure
2—194 H.P.—ASME 72"x20'0" 145 lbs. Pressure
1—150 H.P.—ASME 72"x18'0" 150 lbs. Pressure
1—135 H.P. ..... 66"x18'0" 125 lbs. Pressure

Water Tube

2—364 H.P. B & W with stokers..150 lbs. Pressure
1—250 H.P. Altman & Taylor.....150 lbs. Pressure
1—250 H.P. Heine .....125 lbs. Pressure
1—235 H.P. Heine (oil burner)...125 lbs. Pressure
Priced low for disposition before removal.

Henry A. Hitner's Sons Co.
4501 Richmond Street
Philadelphia, Pa.

GENERATORS

150 KVA General Electric 240 volt, 2 phase, 60 cycle, 600 RPM. Belted.

100 KW General Electric 240 volt, 3 phase, 60 cycle, 720 RPM. Belted.

125 KW 220/440/2200 volt, 3 phase, 60 cycle General Electric direct connected to 14" x 14" Chuse automatic engine.

Other generator sets direct and alternating current.

Send for our monthly list of the largest stock in the United States of slightly used and thoroughly overhauled MACHINE TOOLS, POWER, ELECTRICAL AND CONTRACTORS' EQUIPMENT.

Wickes Machinery Company
Jersey City, N. J.
Established 1900.

6000 K.W. GENERAL ELECTRIC TURBO-GENERATOR

As good as new.

Large stock of Generators, direct connected to engines, transformers, turbines, motors, dynamos, etc.

What do you want?
What have you for sale?

GEORGE SACHSENMAIER CO.
920 N. 3rd St., Philadelphia, Pa.

500 K.W. Rotary Converters

2—500 K.W. Allis-Chalmers 250 volts D.C. 2000 amps., 3 ph., 60 cy., 149 to 153 volts A.C., 720 R.P.M.

2—550 KVA. Allis-Chalmers, 3 phase, 60 cy. transformers, self cooled, 2300 volts primary down to rotary voltage.

A.C. and D.C. Panels, and also one D.C. Feeder Panel.

ARCHER & BALDWIN, Inc.
126 Liberty St., New York, N. Y.
Telephone Rector 4025-6-7.

GENERATING UNITS

75 KW Gen. Elec., 250 Volt, dir. con., 14x12 Ames Engine. **$850.00.**
75 KW Wghse., 125 Volt, dir. con., 13x15 Skinner Engine. **$850.00.**
30 KW Allis-Chal., 125 Volt, dir. con., American Blower Engine. **$550.00.**
Motors and Generators—All sizes.

POWER MACHINERY, INC.
278 Newark Ave., Jersey City, N. J.

BARGAINS

GUY MITCHELL'S

RETIRING SALE

916 N. Fulton, Balto., Md.

M-G Set, Pump, Fan, Compressor and Hoist Motors

	HP.	Speed	Ph. Cy. Type	Volts
	450	585	3 60 Sl. Rg.	440-220
	400	514	3 60 Sl. Rg.	2200-550-440
	300	514	3 60 Sl. Rg.	2200
3—	225	1800	3 60 Sl. Rg.	550
2—	200	1800	3 60 Sl. Rg.	440-220
—	200	500	3 25 Sl. Rg.	440-220 New
—	250	750	3 25 Sl. Rg.	550
—	200	750	3 25 Sl. Rg.	440-220
—	200	235	3 25 Sl. Rg.	540-440-220 New
—	200	450	Cpd. D.C.	230
—	175	214	3 25 Sl. Rg.	440-220
—	150	235	3 25 Sl. Rg.	440-220 New
—	150	500	3 25 Sl. Rg.	440-220 New
—	150	450	Cpd. D.C.	230
—	100	214	3 25 Sl. Rg.	550-440-220
3—	75	750	3 25 Sl. Rg.	550-440-220
—	75	900-500	D.C. Int. Pole	230
—	35	575	D.C.	220 Sht.
—	22	715	3 25 G. E. Crane	440-220
2—	20	1200	3 60 Sl. Rg.	440-220 New
—	15	1200	3 60 Sl. Rg.	440-220
—	13	1200	D.C.	230 Cpd.
—	10	715	3 25 Sl. Rg.	440-220
—	7½	1200	3 60 Sl. Rg.	440-220 New
—	7½	1800	3 60 Sl. Rg.	440-220 New
—	7½	1800	3 60 Imperial	550 New
—	7½	1200-450	D.C.	230
—	5	800-1500	D.C.	230
—	2	1800	3 60 Sq. Cg.	Vertical 440
—	2	1200	3 60 Sl. Rg.	440-220
—	1	1100	3 60 Sl. Rg.	440-220

MOTOR GENERATOR SET

150 KW. MG Set, D.C. 230, with either 60 cycle 220 v. or 25 cy., 550-440 or 220 v. Sl. Rg. Motors

Steam Electric Units

1—Steam Electric Unit direct connected 20 x 21 heavy duty, horizontal, slide valve, outboard bearing engine with 8' x 15" flywheel, 200 kw., 125 volt, 8 pole generator, D. C. Buckeye Engine, Crocker-Wheeler Generator.

1—Steam Electric Unit 12 x 16" horizontal slide valve steam engine, with 72" x 12" flywheel, 100 kw., 125 volts, D. C., outboard bearing generator with iron base, Crocker-Wheeler Generator, Buckeye Engine, direct connected.

INGRAM-RICHARDSON MFG. CO.
Beaver Falls, Pa.

FOR SALE
ELECTRICAL EQUIPMENT

Western Electric Generator, Type S 520 PO, No. 3691, K. W. 150, Phase 3, Cycle 60, volts 220.

Crocker Wheeler Motor, 10 H.P., 1130 R.P.M., cycle 60, volts 220, phase 3, amps. 26.

General Electric Induction Motor, Model No. 1644, type 302 8, 10 H.P., form E, 3 phase, 60 cycle, volts 220, amps. 275.

1 Western Electric Motor, type 5, model BP, 10 H.P., 1720 R.P.M., phase 3, cycle 60, volts 220.

Bernhard Stern & Sons
315 Court Street, Milwaukee, Wis.

GENERATORS

DIRECT CONNECTED UNITS

2—25 K.W., Thompson-Ryan, 125 volt, 300 r.p.m., direct connected to McEwen 9 x 10 C.C. engine .....**$250 ea.**

1—30 K.W., Westinghouse, 125 volt, 300 r.p.m., direct connected to Imperial engine....**$500**

1—100 K.W., Westinghouse, 250 volt, direct connected to a Ball & Wood engine....**$600**

1—125 K.W., Westinghouse, 125 volt, 225 r.p.m., direct connected to Ball & Wood engine.**$800**

1—175 K.W., General Electric, 250 volt, 1200 r.p.m., direct connected to G.E. Synchronous motor, type A.T. 1-6, 440 volt, H.P. output 365, 60 cycle, 1200 r.p.m., including 17½ K.W. motor generator exciter, complete with 5-Panel switchboard and switchboard equipment **$2500**

1—300 K.W., Crocker-Wheeler, 125 volt, 100 r.p.m., direct connected to Watts-Campbell Corliss engine **$3000**

3—75 K.W., General Electric, 250 volt, 2400 r.p.m., compound generators, direct connected to Curtis Two Stage turbines, 150 lbs. working pressure, non-condensing....**$1000 ea.**

Mallory Machinery Corporation
Baltimore, Md.

RANDLE

OFFERS BIG BARGAINS IN

Used and Rebuilt Engine Generator Sets, Turbo Generator Sets, Motors, Rotary Converters, Generators, Motor Generator Sets, Engines, Boilers, Steam and Electric Machinery of all kinds; also Machine Tools. Send for our new machinery list. Yours for the asking.

The RANDLE MACHINERY CO.
1772 Powers St., Cincinnati, Ohio

ELECTRIC MOTORS

230 Volt—D.C.

H.P.	Speed	Make	Type
1—125	900	Gen. Elec.	.....RC-17
1—125	450	Crocker Wheeler	.....CCD
1—100	425	Sprague Elec.	.....D
1— 90	850	Gen. Elec.	.....DLC-305
1— 75	850	Westing.	.....SK-160
1— 65	600	Westing.	.....SA
1— 50	975	Westing.	
1— 50	850	West	
1— 50	525		SECTIONS—
2—50/65	300/900		
2— 50	585/1130	Westing.	.....SK-
1— 45	250/1000	Westing.	.....SK
1— 40	775/1160	Westing.	.....SK-140
2— 40	950	Westing.	.....SK-130
1— 40	550	Allis Cha	.....comp'd.
1— 40	1200	Gen. Elec.	.....DLC-201

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Large stock of Fully GUARANTEED a.c. and d.c. MOTORS — GENERATORS — TRANSFORMERS and ELECTRICAL EQUIPMENT

BELYEA COMPANY
Incorporated
147 West 18th St., New York City

MOTORS

and all
Electrical Equipment
Bought—Sold—Appraised
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L. J. LAND
207 Centre Street
New York
U.S.A.

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A. C. MOTORS

6—450 Hp. Westinghouse, type CW, Slip Ring Motors, 3 phase, 60 cycle, 2200 volt, 435 R.P.M., with control. Used very little.

We have others.

TIPPINS & SPRENGLE, INC.
Oliver Bldg. Pittsburgh, Pa.

TELEPHONE HANOVER 9460 **N.B.PAYNE & CO.** 25 CHURCH ST. NEW YORK

OVERHEAD TRAVELING CRANES and HOISTS

carried in stock;
altered to suit
quick service

What Are Your Needs?

See page 90

Overhead Traveling Cranes
Electric Hoists
Foundry Equipment
In stock for prompt shipment
Send for our latest list

T. B. MacCABE
2641-43 Christian Street
Philadelphia, Pa.
Long Distance Telephone Locust 3577

CRANES CRANES CRANES

100 Ton with 25 Ton Aux., 60 ft. span.
50 Ton, 50'0" and 80'0" span.
35 Ton, 25'10" and 25 ton, 60'0" span.
15 Ton Spans—22'0", 57'0", 66'0" and 100'0".
10 Ton Spans—22'6", 51'0", 73'0", 80'6", 100'0".
7½ Ton—34'9" Span.
5 Ton—29'6", 36', 38', 40', 45' and 48'.
3 Ton Spans—30'0", 39' and 70'6".
3—GANTRYS—Span up to 260', 3 cu. yd.
Locc Cranes—Steam Turbos—Crushers

ROSS POWER EQUIP. CO.
15 S. Meridian St., Indianapolis, Ind.

One Type H No. 4 Brownhoist Locomotive Crane

Standard Gauge, 15 tons capacity, 50-ft. boom, equipped with grab bucket, generator and lighting system.

ADDRESS BOX B-340
care *The Iron Age*, 239 W. 39th St., New York.

LOCOMOTIVE CRANES

[illegible]nhoist 15 ton, 8 wheel, D.D., 50' and [illegible]019. rebuilt, price $6500

1 [illegible] D., 50' boom, new 1923, first class condition, price $8000 f.o.b. near Baltimore.

A. R. GELINAS
5614 Sherbrooke Street West, Montreal, Canada

Locomotive Cranes

2—Rebuilt BROWNHOISTS, 8 wheel MCB, double drums, one with 48 ft. boom and one with 76 ft. boom. Fine condition.

1—BROWNING No. 8, 20 ton cap., 8 wheel MCB, double drums. Excellent condition.

PHILIP T. KING
"The Crane Man"
50 Church Street New York

FOR SALE

One used (1) five-ton—"P & H"—110 Volt—three-motor Traveling Crane. 38 ft. 8" span, 35 ft. lift.

ADDRESS BOX B-389
care *The Iron Age*, 239 W. 39th St., New York.

1—5 Ton Shepard Hoist, 220 Volt, D. C., Hook Suspension.

1—3 Ton Shepard Hoist, 220 Volt, D.C., Variable Speed, Hook Suspension.

2—5 Ton P. and H. Type U Hoists, 220 Volt, D. C., Variable Speed, Lug Suspension.

These hoists are in good condition and are being replaced by heavier equipment.

The John B. Morris Foundry Co.
Cincinnati Ohio

Large Tonnage of Valves & Fittings Machinery and Machine Tools

AT PUBLIC AUCTION

To be sold without limit or reserve Thursday, October 7th, 1926. 11 A.M. Standard Time.
At Warehouse, No. 2820 N. Tioga St., Philadelphia, Pa.

(Note: Warehouse is on corner of Melvale St. Melvale Street is ½ block east of Richmond St.)

Approx. 265 Tons New Brass and Iron Body Standard Valves and Fittings.

Brass Globe Valves, Gate Valves, Check Valves, Safety Valves, Injectors, Ejectors, Blow-Off Valves, various sizes, Jenkins and Lunkenheimer.

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1″	$5.75	$5.25	$4.75	$4.38	$4.13	$4.00
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3″	15.75	14.25	13.13	12.38	12.00	11.63
4″	19.00	17.50	16.50	16.00	15.50	15.00
5″	23.75	21.88	20.63	20.00	19.38	18.75
6″	28.50	26.25	24.75	24.00	23.25	22.50
8″	38.00	35.00	33.00	32.00	30.00	29.00
10¾″	48.87	44.00	42.07	42.07	40.00	38.67
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100 Arthur St., Buffalo, N. Y.

SPECIALISTS IN
Aluminum Bronze Die Castings
Chilled Tin Bronze Castings
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CASTINGS
ENAMELING
MACHINE WORK

Send Blue Prints for Estimates or ask to have representative call.
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Burlington, N. J.
Telephone Burlington 309

HAY FOUNDRY
& IRON WORKS
NEWARK, N. J.
GRAY IRON CASTINGS
LIGHT, MEDIUM AND HEAVY
Our own Pattern and Machine Shop

DE MATTIA FOUNDRY & MACHINE CO.
CLIFTON, N. J.
Light, Medium & Heavy
GRAY IRON AND SEMI-STEEL CASTINGS

Small Soft Gray Iron Castings
In production quantities, for machining General Class Electrical Instruments. Textile Machinery, Automobile Parts, Toys, etc.
KLINE HARDWARE CO.
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Our Specialties — Gray Iron Castings
Superior quality, machine or hand moulded, sand blasted, pickled or tumbled. On good tonnage we will make special moulding equipment that will warrant you the best price and most efficient service. Patterns made of wood, brass aluminum or iron.
Grinding wheel machinery, hack saw machines, Huntington emery wheel dressers and cutters, drill press vises, wire rod cutters.
NORTH WALES MACHINE CO., INC.
North Wales, Pa.

BRASS & BRONZE CASTINGS
1 lb. to 2000 lbs.
Capacity 16,000 lbs. per day
OUR SPECIALTIES
WORM AND GEAR BRONZE, BRIDGE BRONZE, ACID PROOF BRONZE, BRONZSTOX BUSHINGS & BARS.
A. W. CADMAN MFG. CO., Pittsburgh, Pa.
Established 1860

Established 1911 *Incorporated* 1916
Bronze, Brass and Aluminum Castings
1 oz. to 4000 lbs.
General Machine Work
THE SHOOP BRONZE CO.
Tarentum, Pa.

Small Iron Castings
of Every Description
We Make, Machine, Finish, Polish, Plate and Assemble Parts. Quantity production a specialty. Send sample for prices.
Gray Iron Foundry Co.
Established 1903
Reading, Penna.

Malleable Castings
We manufacture the finest line of small malleable castings made. Every piece properly annealed. Extra smooth finish for plating.
Let us quote.
BERGER BROS. CO
229 Arch St., Philadelphia, Pa.

GRAY IRON
CASTINGS
UP TO 1½ TONS
PROMPT SERVICE
Send blueprints for reasonable prices.
Penn Foundry & Manufacturing Co.
Reading, Pa.

Gray Iron Castings
Machine Work
Steel Stacks
Plate and Sheet Work
Osborn Machine Co.
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QUALITY GRAY IRON CASTINGS
Light and medium castings of special mixture to withstand high pressure and hard wear, such as pistons, cylinders, valves and bushings.
ATHENS FOUNDRY CO., Athens, Pa.

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CASTINGS
FINISHED OR UNFINISHED
LIGHT AND MEDIUM MACHINE WORK
QUOTATIONS GLADLY GIVEN
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Greensburg, Pa.

GRAY IRON CASTINGS *Small and Medium Weight*
Soft, close grain well finished castings. Equipped for machine or hand moulding, production or short run orders. Good shipping connections.
THE XENIA FOUNDRY & MACHINE CO.
400 North West St., Xenia, Ohio

MISCELLANEOUS
FORGINGS, PATTERNS, GALVANIZING, WELDING, Etc.

DROP FORGINGS
We are in a position at this time to name some mighty attractive prices and delivery.
Any size from any steel.
Allowing us an opportunity to quote will not be regretted.
W. P. PAUL CO., PHILA., PA.

Drop **FORGINGS** Hammered
Weldless Rings, Crank Shafts, Spindles, Upset Bars, Drop-Forged Gear Blanks, etc. Alloy or Carbon Steels. Prompt Shipment.
STEEL CASTINGS
CHESTER STEEL AND FORGE CO.
P. O. Box 74 Chester, Pa.

Quality HAMMERED STEEL FORGINGS
Axles, Billets, Cranks, Crusher Shafts, Discs, Grinding Balls, Liner Plates, Shafting, Shoes and Dies for Stamp Mills and Forgings for Ore Mines.
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PATTERNS
WOOD AND METAL
Built to suit Foundry Production, Service and Satisfaction Guaranteed. Quotations cheerfully given.
ALLISON PATTERN WORKS
460 Bacon St., Dayton, Ohio

WOOD and METAL PATTERNS
of every description
The Cleveland Castings Pattern Co.
1930 East 61st St., Cleveland, Ohio

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PATTERN WORKS
INCORPORATED
PATTERNS, MODELS and MANUFACTURING
LARGE AND SMALL WOOD OR METAL
PHONE SUPERIOR 7313
231-233 WEST GRAND AVE., COR. FRANKLIN
CHICAGO

PATTERNS, wood and metal
Aluminum Match Plate Patterns, Brass, Bronze, and Aluminum Castings. May we have your inquiries?
Modern Machine & Pattern Co.
Terre Haute, Ind.

HOT DIP GALVANIZING
We have the largest hot dip galvanizing plant and kettles in the United States. We have the most modern equipment to do first class galvanizing at lowest prices. Prime Western Zinc Used Exclusively. Galvanized products furnished.
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Guaranteed RUST PROOFING
First-class and Immediate
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Philadelphia Galvanizing and Tinning Works
Galvanized Angles, Cut to Length and Punched
Carried in Stock:
Galvanized Bars, Channels, Ovals, Half Ovals
Bolts, Spikes and Other Materials.
Tioga, Sepviva and Witte Sts.,
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Exceptional Facilities for Hot Dipping Members Up to 45 Ft.
Carload Lots or Less
STEEL TOWERS FABRICATING
Write for Prices
International Derrick & Equipment Co.
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BATES GALVANIZING
Hot dip process—Automatic heat regulated kettles—Thirty-seven foot vats—Prime Western spelter—Excellent railroad connections—SERVICE. Request our booklet.
Bates Expanded Steel Truss Co.
East Chicago, Indiana

BUSINESS OPPORTUNITIES

Somebody Is Looking for This

Manufacturing Plant

At Erie, Pa.

Six large monitor type buildings of brick and steel, and other structures, on 10 acres finely located property; particularly adapted for erection of heavy machinery or railroad car repair plant, 110,000 sq. ft. manufacturing area.

Workmen's cottages surround the plant, Pennsylvania and New York Central tracks laid throughout, in and outside buildings, with modern traveling crane. One-half the plant is new.

High quality labor is available at low rates, cheap Lake Erie transportation and water.

Less than ½ replacement value is asked today. Satisfactory terms can be arranged.

Complete details on request.

Gaillard Realty Co.

Business Established 1796

"Factories Exclusively"

100 E. 42nd Street, New York

FOR SALE

A thoroughly equipped Factory and Machine Shop for the making of Steam and Hot Water Boilers, Electric Hoists, Road Graders and Deep Well Drills. Situated in a city of ten thousand, in one of the richest sections of Iowa, and is ready for business in a day's time.

ADDRESS BOX B-407

care *The Iron Age*, 239 W. 39th St., New York.

SPECIALISTS IN

FACTORIES

FOR SALE OR LEASE

Have professional engineers with considerable plant experience and who can therefore better appreciate your requirements, aid you in locating a suitable factory.

TECHNICAL SERVICE COMPANY
Woolworth Bldg., N. Y. C. Whitehall 8412

ELECTRIC TRAVELING CRANE BUSINESS FOR SALE

The Chesapeake Iron Works having sold their manufacturing plant offer for sale all patterns, drawings, gauges, jigs, etc., with good will and name for the manufacture and sale of the well-known Chesapeake Electric Traveling Crane. There are several hundred Chesapeake Cranes in operation in this country and Europe. This is an unusual opportunity and the price is right.

Address: **CHESAPEAKE IRON WORKS**
702 Keyser Building, Baltimore, Md.

FACTORY SITE FOR SALE

7 acres located between the Simonds Steel Mills and the Upson Wall Board plants. Two million dollar corporations who have purchased their land from me. New York Central and Erie R. R. service. Sewer, water, gas, near power line. Cheap power.

A. H. STEVENS
135 South St., Lockport, N. Y.

OFFICES

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All Light

Convenient to all Subways

Five minutes from Engineers' Club and Engineering Societies Bldg.

MODERATE RENTALS

Phone	Room
Penn. 1980	1205

An Opportunity to Buy a Portable Electric Tool Business

From a company who manufacture a more complete line of Portable Electric Drills, Grinders, etc., etc., than any other concern in that line.

ADDRESS P. O. BOX 586
Cincinnati, Ohio

FOR SALE

Because of a desire to retire from active business, we offer for sale our factory buildings, land, water power, machinery, tools, equipment, etc., used in the manufacture of Cranes, Hoists and other Material Handling Equipment. For particulars

ADDRESS BOX B-341

care *The Iron Age*, 239 W. 39th St., New York

For Sale Cheap for Cash

Gray iron foundry located on two railroads, 50 miles from Boston in a manufacturing city of nearly 50,000 inhabitants. Foundry now in operation. In first-class condition.

ADDRESS BOX B-386

care *The Iron Age*, 239 W. 39th St., New York.

$10,000 BUYS

20,000 sq. ft. one-story brick building, just rebuilt in heavy industrial zone of Newark, with railroad siding; craneways.

$25,000 BUYS

75,000 sq. ft. one-story brick building, just rebuilt; 30 ft. high; in heavy industrial zone of Newark; with ocean transportation direct to dock on Passaic River, with railroad siding; 2—15-ton cranes; 4 acres land.

GROSS & GROSS
20 Clinton St., Newark, New Jersey

GOING MANUFACTURING PLANT FOR SALE

The Property and Good-Will of a going manufacturing Company, adapted to a concern wishing to manufacture articles of cast iron and steel.

An investigation will prove that the Company is now making a very profitable line both of new equipment and a large sale of repair parts, and the business is capable of profitable expansion. The fact that the present owner has other large interests to look after is reason for sale.

Those wishing to establish a business or branch in the Birmingham, Alabama district should investigate. All correspondence confidential.

Jemison & Company, Agents
Birmingham, Alabama

FOR SALE

52,000 acres in Tennessee. Three railroads, two highways, five seams of coal, one seam iron ore, one hundred million feet timber. Carries all raw materials for blast furnace. Close to markets. For full particulars, address

H. L. CORY REALTY COMPANY
Chattanooga, Tennessee

FOR SALE

Have large Machine Shop, Plate Shop and Foundry for sale, equipped for large work.

Address Box B-417

Care *The Iron Age*, 239 W. 39th St., New York

BLAST FURNACE

located on Pennsylvania and Reading Railroads, and Schuylkill River.

LEESPORT FURNACE CO.
LEESPORT, PA.
Philadelphia Office: 419 New Market Street.

SHAPER BUSINESS FOR SALE

A well established line of Shapers on the market 45 years. Drawings, patterns, jigs, parts, and good will, for 16", 20" and 24" stroke Shapers. $2000.00 takes it.

CRANKSHAFT MACHINE COMPANY
Jackson, Michigan

FACTORY LOCATIONS

Chicago-Calumet District

Factory sites on Belt Line giving access to all railroads entering Chicago, cheap fuel, good labor market. Free Map of Chicago-Calumet District. Brokers Protected. Will assist to finance.

THE CALUMET WORLD
Promotion Dep't. 105 West Monroe
Chicago, Illinois

Profit by using

THE CLASSIFIED SECTIONS

of The Iron Age

To Inventors or others with marketable articles that can be made of PRESSED STEEL 1-8 to 5-16 inch

WRITE at once submitting blue prints, drawings or sketches, with information as to possible market and terms upon which manufacturing rights can be secured. If patented send copy of patent.

This is a real opportunity for someone with a worth-while article or idea. Remember we are interested only in what can be produced from pressed steel $\frac{1}{8}$" to $\frac{5}{16}$" thickness.

This company has unusual plant facilities and raw material affiliations, ample capital and successful management but is planning for diversification of manufacture. Is prepared to purchase approved article outright or to manufacture and market on a royalty basis. Your letter will be held in strictest confidence and should be addressed to "Development Department" care,

The MIDLAND STEEL PRODUCTS CO., P. O. Box 419, Cleveland, O.

Important! Perhaps you may know of someone for whom this is an amazing opportunity to go ahead with an idea that has been slumbering for lack of capital. Put them in touch with this advertisement or write us so we can get in touch with them. The MIDLAND STEEL PRODUCTS CO.

AGENCY WANTED

An aggressive and well-organized firm wants another line for the New York and New Jersey territory on a commission basis. A specialty or product sold to the building trade is preferred, though we will consider anything having sales possibilities. Send complete information to

Box B-404
care *The Iron Age*, 239 W. 39th St., New York.

In Order to Increase Volume

a well established company will consider taking over or consolidating with a company producing an established line of metal stamped goods up to $100,000 volume.

ADDRESS BOX B-363
care *The Iron Age*, 239 W. 39th St., New York.

STEEL CASTINGS FOR RAILROAD MATERIAL

The most important steel foundries in Belgium are wanting sales agent in U. S. A. with good connections in the Railroad world. General castings, axleboxes, buffers, automatic couplers, rail lifters, rerailers, wheel centres, etc.—also castings for electrical machinery a specialty.

Write to **Usines Emile Henricot, Court-St.-Etienne (Belgium)**

Your New York Office

Manufacturers' Sales Representative. Extensive Eastern domestic connections with Industrial Plants and known personally to the largest buyers and dealers in most foreign countries. Executive—fifteen years selling highest class Machine Tools, all Industrial Mechanical Equipment and Supplies. Desires represent Manufacturers, preferably commission basis.

ADDRESS BOX B-339
care *The Iron Age*, 239 W. 39th St., New York.

Canadian Sales Company

at present selling Engineering Equipment and supplies to general industrials, railways, shipyards, pulp and paper mills, etc., is open to consider one additional line for intensive sales effort.

ADDRESS BOX B-347
care *The Iron Age*, 239 W. 39th St., New York

WANTED—

Medium or Heavy Machinery to Manufacture

We want something running $100,000 to $500,000 in Annual Sales.

ADDRESS P. O. BOX 730
Springfield, Ohio

We Desire Correspondence

with principals who have machinery manufacturing business needing a modern machine shop for its production, or a used machinery business requiring warehouse and shop for rebuilding. Location Central Pennsylvania. Might assist in additional financing if required.

ADDRESS BOX Z-951
care *The Iron Age*, 239 W 39th St., New York.

OPPORTUNITY

I will entertain participation with established and profitable manufacturing concern that can use modern plant of 20,000 square feet of floor space.
Plant is located within 20 minutes trucking to the center of Philadelphia, own railroad siding and electric crane equipment, with ample ground for expansion.
Must have comprehensive details in first letter.

W. H. LUTZ,
2520 Morris St., Philadelphia, Pa.

MANUFACTURERS' AGENT

desires specialty—to sell stores or industrial plants—wholesale or retail—commission—New York City and vicinity. Have been selling this territory for eight years.

FRED E. BARKER
5108 Tilden Ave., Brooklyn, N. Y.

Services Offered

by party having had twenty (20) years' experience buying all classes of salvage material, scrap steel and metal. Would entertain buying and selling on commission basis. Have established office in New York City, and is well versed in all branches of the second-hand machinery, iron, steel, metal and hardware lines.

ADDRESS BOX B-416
Care *The Iron Age*, 239 W. 39th St., New York.

ARE YOU LOOKING FOR A FIRM TO MANUFACTURE YOUR MACHINE OR METAL PRODUCT?

A well established and thoroughly responsible company, located in Rochester, N. Y., and engaged in the manufacturing of medium and light machinery and stamped metal products, wishes to add to its line. Metal articles or small machines already on the market preferred, but will consider manufacturing and perhaps marketing any metal article or small machine either on royalty or outright purchase which appeals to it as having sufficient merit.

ADDRESS BOX Z-74
care *The Iron Age*, 239 W. 39th St., New York.

TREASURY DEPARTMENT, Office of the Supervising Architect, Washington, D. C., Sept. 23, 1926. SEALED PROPOSALS will be opened in this office at 3 P. M., Oct. 14, 1926, for remodeling the U. S. Post Office and Court House at Erie, Pa. Drawings and specifications may be obtained from the Custodian of the building or at this office in the discretion of the Supervising Architect. Jas. A. Wetmore, Acting Supervising Architect.

PATENTS

Expert on metal products and metallurgical patents. Examiner U. S. Patent Office for 16 years.

JOHN BOYLE, Jr.—Patents
201 Ouray Building Washington, D. C.

HELP WANTED

This Advertisement Will Be Read By a Man Who Wants a Bigger Future

He is young enough to be aggressive and old enough to be solidly on the ground. He is now selling to railroads, mining companies, public utilities or industrials.

Of course he will have a record of past performances that will bear careful analysis — and an acquaintanceship in these fields that will help to simplify the sales of a quality product, sold nationally for over thirty-eight years.

This man may now be a successful salesman — with the ambition to go higher. The Job is important and the remuneration in keeping.

LOCATION—Metropolitan District, New York City.

Only applications giving complete business history, training, age, personal qualifications, etc., will be considered.

Everyone in our organization has seen this advertisement.

Address Box B-410,
Care *The Iron Age*, 239 W. 39th St.
New York

HELP WANTED

SALES ENGINEER

A nationally known company in the Middle West, producing and selling an office machine, is in a position to manufacture articles or small machines complete in addition to its regular line, and desires the services of a Sales Engineer to bring in such work. A high pressure system of production and careful supervision insure low costs and high quality. Any mechanical device manufactured may also be serviced by factory trained experts located in 160 cities of this country, and all principal foreign cities. Correspondence invited.

ADDRESS BOX B-395
care *The Iron Age*, 239 W. 39th St., New York.

FACTORY SUPERINTENDENT, with experience as executive, familiar with designing, stamping, assembling and enameling of sheet metal products. Have inventive ability and be capable of developing special ideas and designing and producing labor saving and automatic tools and fixtures. Knowledge of time studies and production methods invaluable. Salary $5,000 per year. Location within ten miles of New York. Letters must give in strict confidence full particulars as to education, age and experience and present employment. Address Box B-383, care *The Iron Age*, 239 W. 39th St., New York.

DROP FORGING SALESMAN or AGENCY to handle output of plant making small forgings in quantity lots. Must be thoroughly familiar with forging game both from Sales and Technical standpoint. Excellent opportunity for anyone with proper training and entree to prospective buyers. Address Box B-400, care *The Iron Age*, 239 W. 39th St., New York.

WANTED—HIGH GRADE TOOL STEEL SALESMAN. Excellent opportunity for energetic man. Must be fully capable of selling on a large basis and thoroughly familiar with carbon and alloy steels. State age, reference, and general experience. Address Box D-134, care *The Iron Age*, 1507 Otis Bldg. Chicago.

PRESSED STEEL SALESMAN—We have a permanent position for a thoroughly experienced and competent Pressed Steel Salesman. A man who has actually sold pressed steel parts in large volume. A man who can repeat. TRUSCON STEEL COMPANY, YOUNGSTOWN, OHIO.

EXPERIENCED MALLEABLE FOUNDRY SUPERINTENDENT, thoroughly familiar with latest practice and willing to invest not to exceed $10,000 in new company to operate in Southern California. Address Box B-391, care *The Iron Age*, 239 W. 39th St., New York.

WANTED — SALES REPRESENTATIVE for New York and Northern Pennsylvania. Man that can handle Drop Forgings on commission' basis. Large plant, 27 drop hammers. Board and steam, from 1000 lb. to 2700 lb. Address Box B-385, care *The Iron Age*, 239 W. 39th St., New York.

ENGINEER DRAFTSMAN. Growing company developing a new line of steam power plant equipment has an opportunity in the engineering department for a young engineer qualified as a draftsman and calculator. Address Box B-399, care *The Iron Age*, 239 W. 39th St., New York.

WANTED—COMPETENT ACID STEEL MELTER with at least five (5) years experience. Location East. Give full details of experience, reference, age and other necessary data in first letter. Address Box B-370, care *The Iron Age*, 239 W. 39th St., New York.

ASSISTANT WORKS MANAGER. Young, active man, familiar with modern malleable practice in quantity production of light and heavy work. Address Box B-396, care *The Iron Age*, 239 W. 39th St., New York City.

WANTED—A TOOL STEEL SALESMAN, familiar with Connecticut territory. Communications strictly confidential. Address Box B-361, care *The Iron Age*, 239 W. 39th St., New York.

WANTED — EXPERIENCED MANGANESE STEEL CASTINGS SALESMAN. ADDRESS BOX B-345. CARE *THE IRON AGE*, 239 W. 39th St., New York.

WANTED—METALLURGIST experienced in the production and heat treatment of alloy steel castings. Address The Alloy Cast Steel Co., Marion, Ohio.

HELP WANTED

Mechanical Designers

Experienced in general Steel Mill work. Address

R. A. DYE, Employment Manager
Jones & Laughlin Steel Corporation
Woodlawn, Pa.

A MECHANIC to take charge of a JOBBING MACHINE SHOP engaged in building accurate special machinery, dies and tools. Must know all phases of shop work from designing of jigs and fixtures to production of special parts in quantities. Preference will be given to those experienced in operating similar plants. The right man can become a stockholder in this established business by proving his ability and displaying the proper spirit towards his work. State fully salary and past experience. Address Box B-402, care *The Iron Age*, 239 W. 39th St., New York.

TIME STUDY ENGINEER. Young engineer, preferably under thirty, for time study work. Applicant must have ability to make time studies and use them as basis for manufacturing methods, wage incentives, job costs, contract estimates, and floor space apportionment. Location Eastern Pennsylvania. Give age, education and experience in detail. Address Box B-398, care *The Iron Age*, 239 W. 39th St., New York.

ASSISTANT FOUNDRY SUPERINTENDENT for electric steel jobbing foundry located in Southern California. Must have practical experience in both bench and floor molding and able to handle men. Wonderful opportunity for right man. Give full information, age, experience, references and salary expected. Address Box B-286, care *The Iron Age*, 239 W. 39th St., New York.

EMPLOYMENT SERVICE

SALARIED POSITIONS
$2,500 to $25,000

If you are qualified for position between $2,500 and $25,000, and are receptive to negotiations for new connection, your response to this announcement is invited. The undersigned provides a thoroughly organized service, established sixteen years ago, to conduct confidential preliminaries, and assist the qualified man in locating the particular position he desires. Not an employment agency. Retaining fee protected by refund provision, as stipulated in our agreement. Send name and address only for description of service. **R. W. Bixby, Inc., 274 Main St., Buffalo, N. Y.**

SITUATIONS WANTED

SALES EXECUTIVE. Eighteen years' experience, manufacture and sale, bars, bands, small shapes, reinforcing, sheets and wire products, wants connection in any capacity with future. Splendid record, best references, energetic, pleasing personality, able to produce results. Good reasons for change. Address Box B-426, care *The Iron Age*, 239 W. 39th St., New York.

GREY IRON FOUNDRY MAN. Qualified for position as manager, superintendent or sales executive. 25 years' practical experience in all phases of foundry work. Address Box C-906, care *The Iron Age*, 1362 Hanna Bldg., Cleveland, Ohio.

STEEL SALESMAN. Thoroughly experienced various lines, especially familiar with reinforcing products. Available due to unusual circumstances. Good record in executive positions. Address Box B-423, care *The Iron Age*, 239 W. 39th St., New York.

ROLLER, experience eighteen years, Guide or Hand, Iron or Steel, eight, ten, twelve or sixteen inch mills. Rounds, squares, hexagons, octagons, angles and all shapes, also horse shoes. Can give best reference. 6334 Howe St., Pittsburgh, Pa.

SALES REPRESENTATIVE OR DISTRICT MANAGER for manufacturing plant. 20 years' successful experience in management and sales. Address Box C-907, care *The Iron Age*, 1362 Hanna Bldg., Cleveland, Ohio.

SITUATIONS WANTED

Chief Plant Executive

An Engineer who gets the whole personnel in the game and produces results through good feeling.

ADDRESS BOX B-355
care *The Iron Age*, 239 W. 39th St., New York.

SALES MANAGER or GENERAL MANAGER. Age 40, graduate engineer, fifteen years' experience as sales manager, general manager and executive. Recently resigned as general manager of steel products manufacturing company. Open for engagement from September 15. Location preferably East. No objection to traveling. A satisfactory connection more essential at start than salary. Especially well experienced in establishment of sales agencies and building up sales organizations. Correspondence solicited with high grade well rated manufacturing companies only. Address Box B-358, care *The Iron Age*, 239 W. 39th St., New York.

SALES TO JOBBERS—HAVE FRIENDLY, WELL ESTABLISHED ACQUAINTANCE OF 18 YEARS, SELLING HARDWARE JOBBERS, TONNAGE STEEL PRODUCTS, IN CENTRAL WEST. HAVE LARGE PERCENTAGE UNDER CONTRACT NOW. IF YOU HAVE MERITORIOUS LINE YOU WANT PUSHED, WHERE COMPENSATION WILL AVERAGE OVER $10,000 PER YEAR, WRITE BOX B-413, CARE *THE IRON AGE*, 239 W. 39TH ST., NEW YORK.

YOUNG MAN IN THIRTIES, with steel mill influences from earliest youth, good education, practical experience in operating and purchasing departments, several years' sales experience, traveling and district office, including executive positions, especially qualified as assistant to executive, requiring tactful cooperation with various departments or confidential work. Record will stand rigid investigation. Address Box B-425, care *The Iron Age*, 239 W. 39th St., New York.

PLANT EXECUTIVE, TECHNICAL, IN THE AGRICULTURAL IMPLEMENT BUSINESS, HAS GOOD REASONS FOR CHANGE. YOUR INVESTIGATION WILL BE CONVINCING OF SUCCESSFUL RECORD. ADDRESS BOX B-414, CARE *THE IRON AGE*, 239 W. 39TH ST., NEW YORK.

SALESMAN, now employed, desires connection with manufacturer for CONNECTICUT or SOUTHERN NEW ENGLAND territory. Three years' experience selling mill supplies and tools. Acquainted throughout state. American, single, 24 years old. Best references. Address Box B-298, care *The Iron Age*, 239 W. 39th St., New York.

MANUFACTURER'S REPRESENTATIVE. Engineer, graduate, ten years' selling experience in Detroit territory. Wanted sheet steel screw machine work or stamping. Commission basis. Have well located office and automobile. Address Box M-26, care *The Iron Age*, 7338 Woodward Ave., Detroit, Mich.

WORKS MANAGER, 41, desires connection with reliable concern. Wide and varied experience in production management and drawing office control. Capable of supervision both designing and manufacturing. Address Box B-415, care *The Iron Age*, 239 W. 39th St., New York.

CHEMICAL ENGINEER, University graduate, with four years' experience in chemical, physical and micro laboratories, wishes position in steel laboratory or in plant. Address Box B-412, care *The Iron Age*, 239 W. 39th St., New York.

RAIL STEEL. Active man, 37, good health, thoroughly experienced operations and sales rail steel products, desires sales or executive position with growing organization. Best credentials. Address Box B-424, care *The Iron Age*, 239 W. 39th St., New York.

ENGINEER; extensive and successful Industrial, Mechanical, Sanitary and Civic experience, will represent reputable lines on Pacific Coast. Address Box B-390, care *The Iron Age*, 239 W. 39th St., New York.

EXECUTIVE—Twenty years with the largest concerns in the industry. Factory work, modern stores control, purchasing, selling, management. Address Box B-328, care *The Iron Age*, 239 W. 39th St., New York.

WANTED—A mill, or night turn on same, by a COMPETENT FOREMAN ROLLER. References given. Address Box B-307, care *The Iron Age*, 239 W. 39th St., New York.

SITUATIONS WANTED

SALES EXECUTIVE:—LONG AND WIDE EXPERIENCE IN SALES MANAGEMENT AND SALES PROMOTION. HAS ALSO EXPERIENCE AS SECRETARY AND FACTORY MANAGER OF EASTERN METAL WORKING PLANT. WILL LOCATE ANYWHERE. SALARY SECONDARY CONSIDERATION UNTIL VALUE HAS BEEN PROVEN. BUSINESS RECORD CLEAN. REFERENCES ARE THE HIGHEST. ADDRESS BOX B-333, CARE *THE IRON AGE*, 239 W. 39TH ST., NEW YORK.

Position desired by able man for past fourteen years MASTER MECHANIC one of the large Eastern plants manufacturing electrical devices. Thoroughly familiar with operation and production of press room, automatic screw machines and tool rooms. Will consider offer from Middle West or elsewhere. Now engaged but services immediately available. Address Box B-393, care *The Iron Age*, 239 W. 39th St., New York.

MANAGER, SUPERINTENDENT, practical and technical training, wide and varied experience from the building and organization of a factory to the delivery of the finished product. Good mechanic and executive with record of results, credentials of a high order. Address Box B-387, care *The Iron Age*, 239 W. 39th St., New York.

EXPERIENCED FOUNDRY SUPERINTENDENT with comprehensive experience in charge of the erection, equipping and operating of many important plants. Twenty-five years' record of successful management. Invite closest investigation. Address Box 7182-A, care *The Iron Age*, 1507 Otis Bldg., Chicago.

STEEL PLANT ENGINEER. 20 years experience operating and construction desires position in charge of ESTIMATING AND PREPARATION OF APPROPRIATION REQUESTS. Address Box B-336, care *The Iron Age*, 239 W. 39th St., New York.

WORKS MANAGER, Technical Graduate, thorough shop and drafting training. Experienced as executive in production, design, costs, purchasing, maintenance, plant layout and organization. Address Box B-55, care *The Iron Age*, 239 W. 39th St., New York.

MACHINE SHOP SUPERINTENDENT, with a thorough knowledge of modern machine shop and tool practice, a producer, with unquestionable ability and references. Address Box C-910, care *The Iron Age*, 1362 Hanna Bldg., Cleveland, O.

WANTED—Position as master mechanic. Technical graduate, with several years' experience as master mechanic over blast furnaces and coke plant. Best of reference. Address Box B-114, care of *The Iron Age*, 239 W. 39th St., New York.

SALES REPRESENTATIVE desires account of merit for Pittsburgh and Ohio territory. Wide acquaintance and thorough knowledge steel products. Address Box B-375, care *The Iron Age*, 239 W. 39th Street, New York.

GRADUATE of AUSTRIAN METALLURGICAL SCHOOL, with practical plant experience, desires position with crucible steel company. Willing to start in plant, office or laboratory. Address Box B-381, care *The Iron Age*, 239 W. 39th St., New York.

STEEL CASTING ACCOUNT desired by Sales Representative for Western Pennsylvania and Eastern Ohio Territory. Address Box B-376, care *The Iron Age*, 239 W. 39th Street, New York.

SALES ENGINEER, well established in Pittsburgh District, wants additional accounts. Accounts given personal attention by live wire organization. Address Box A-780, care *The Iron Age*, 1002 Park Building, Pittsburgh, Pa.

FIRE-BRICKLAYER, experienced in building kilns and furnaces for the Ceramic, Enameling, Glass, Iron and Steel Industries, wants a position. Address Box B-392, care *The Iron Age*, 239 W. 39th St., New York.

SALESMAN, now employed, desires connection with manufacturer for New York territory. Eight years' experience. Address Box B-401, care *The Iron Age*, 239 W. 39th St., New York.

SITUATIONS WANTED

HIGH GRADE MANAGER

Worked up from journeyman, pattern maker and molder to management of hundreds of men by making large cost reductions. Extensive machine shop experience. Resourceful. Modern business experience and training. Wants position as General Manager, Works Manager or Assistant to President. Worked way through Engineering College, Member A.S.M.E. Good Organizer and Executive who gets results without big expenditure.

ADDRESS BOX B-58
care *The Iron Age*, 239 W. 39th St., New York.

I have had ten years' experience with a New England JOBBING STEEL FOUNDRY, the last five years of which have been of an executive nature, supervising production, costs, finances, accounting and maintenance of service to customers. Would now like to change for position with larger opportunities, where this training will be a mutual help. Address Box B-409, care *The Iron Age*, 239 W. 39th St., New York.

SUPERINTENDENT or WORKS MANAGER, 26 years' mechanical and executive experience in the production of machine shop and foundry products. Have had a well-rounded shop and executive experience through the positions of Inspector, Foreman, Superintendent and Manager. Available about January 1st. Address Box B-419, care *The Iron Age*, 239 W. 39th St., New York.

ENGINEERING EXECUTIVE. HAVE A THOROUGH THEORETICAL AND PRACTICAL EDUCATION BACKED BY YEARS OF EXPERIENCE IMPROVING PRODUCTION QUALITY AND CONDITIONS. WILL CONSIDER OTHER EXECUTIVE POSITION. P. O. BOX 335, YONKERS, NEW YORK.

STEEL and METAL MAN, with extensive American and Foreign experience, open consider position with manufacturers or merchants, or in a purchasing or sales department. Familiar with steel, metals and raw material and domestic and foreign business. Address Box B-421, care *The Iron Age*, 239 W. 39th St., New York.

GENERAL FOUNDRY FOREMAN, Iron and Steel; 40 years of age, 20 years' experience jobbing and production. Practical metallurgist, McLain graduate; semi-steel a specialty; capable executive and good organizer. Address Box B-406, care *The Iron Age*, 239 W. 39th St., New York.

ENGINEERING GRADUATE with 4 years' experience in drafting room desires to get into other work, preferably such as will develop into position in production department. Address Box A-782, care *The Iron Age*, 1002 Park Building, Pittsburgh, Pa.

GRADUATE MECHANICAL ENGINEER, 22 years' experience, rolling mill designer—three years design and operation of Pilger seamless tube mills—desires to connect with expanding concern. Address Box 7183-A, care *The Iron Age*, 1507 Otis Building, Chicago.

PORCELAIN ENAMELER with over twenty years' practical experience on sheet steel in any form and cast iron stove and range parts open for position as foreman or superintendent; age 48. Address Box 7184-A, care *The Iron Age*, 1507 Otis Building, Chicago, Ill.

TOOL STEEL SALESMAN—Connecticut territory. Have been selling this territory for twenty years and am thoroughly familiar with Carbon and Alloy Steel. Only first class mill with full line considered. Address Box B-411, care *The Iron Age*, 239 W. 39th St., New York.

TOOL STEEL REPRESENTATIVE IN NEW YORK OPEN FOR NEW CONNECTION. EXECUTIVE ABILITY, GOOD PERSONALITY. PREFER MID-WEST. ADDRESS BOX B-418, CARE *THE IRON AGE*, 239 W. 39TH ST., NEW YORK.

DETROIT SALES ENGINEER of experience and ability wants to represent sound line of Machinery, Equipment or Production Material on a commission basis. Address Box B-384, care *The Iron Age*, 239 W. 39th St., New York.

SALES REPRESENTATIVE with New York office desires additional account; thoroughly familiar with all grades of steel and steel products. Address Box B-420, care *The Iron Age*, 239 W. 39th St., New York.

Open for position as GENERAL SUPERINTENDENT of ROLLING MILL, either iron or steel. Best of reference. Address Box B-349, care *The Iron Age*, 239 W. 39th St., New York.

PRODUCTS INDEX

ABRASIVE WHEELS—See Grinding Wheels

ACCUMULATORS—Hydraulic
Adamson Machine Co., Akron, Ohio.
Chambersburg Engrg. Co., Chambersburg, Pa.
Elmes, Chas. F., Engrg. Works, Chicago, Ill.
Hydraulic Press Mfg. Co., The, Columbus, O.
Lake Erie Engineering Corp., Buffalo, N. Y.
Southwark Fdry. & Mach. Co., Phila., Pa.
Watson-Stillman Co., 75 West St., N. Y. C.
Wood, R. D., & Co., Philadelphia, Pa.

ACETYLENE—Dissolved in Cylinders
Air Reduction Sales Co., 342 Madison Ave., New York City.
International Oxygen Co., Newark, N. J.

ACIDS—Pickling
American Chemical Paint Co., Ambler, Pa.

AIR TANKS AND CYLINDERS
Air-Tight Steel Tank Co., Pittsburgh, Pa.
Janney-Steinmetz & Co., Phila., Pa.
Scaife, William B., & Sons Co., Pitts., Pa.

ALLOYS—Titanium
Titanium Alloy Mfg. Co., Niagara Falls, N. Y.

ALLOYS—Vanadium
Vanadium Corp. of America, 120 B'way, N. Y. C.

ALUMINUM
Rogers Brown & Crocker Bros., Inc., 21 East 40th St., New York City.

ANGLES, BEAMS, CHANNELS AND TEES
Bethlehem Steel Company, Bethlehem, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
De Coo, Richard, Company, Philadelphia, Pa.
Illinois Steel Co., Chicago, Ill.
Inland Steel Company, Chicago, Ill.
Levine, A. & Co., Chicago, Ill.
Phoenix Iron Co., Philadelphia, Pa.
Republic Iron & Steel Co., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

ANTI-FRICTION METALS — See Babbitt Metal and Bearing Metal

ANVILS
Eagle Anvil Works, Trenton, N. J.
Potts, Horace T., & Co., Philadelphia, Pa.

ARBORS
Cleveland Twist Drill Co., Cleveland, O.
Morse Twist Drill & Mch. Co., New Bedford, Mass.

ARMORING MACHINES—Wire and Cable
Sleeper & Hartley, Inc., Worcester, Mass.

ARMORING SURFACE—For Concrete
Irving Iron Works Co., Long Island City, N. Y.

ARRESTERS—Spark
Harrington & King Perforating Co., Chicago.

AXLES—Car or Locomotive
Bethlehem Steel Company, Bethlehem, Pa.
Carnegie Steel Co., Pittsburgh, Pa.

BABBITT METAL
Keystone Bronze Co., Pittsburgh, Pa.
Magnolia Metal Co., 75 West St., N. Y. C.
Michigan Smelting & Refining Co., Detroit, Mich.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

BAKELITE—Laminated
National Vulcanized Fibre Co., Wilmington, Del.

BALL FLOATS
Naugatuck Mfg. Co., Naugatuck, Conn.

BALLS—Burnishing
Abbott Ball Co., 1047 New Britain Ave., Hartford, Conn.

BALLS—Forged Chrome Steel for Pulverizing
Philadelphia Steel & Iron Co., Phila., Pa.

BALLS—Steel, Brass or Bronze
Abbott Ball Co., 1047 New Britain Ave., Hartford, Conn.
Auburn Ball Bearing Co., Rochester, N. Y.
New Departure Mfg. Co., Bristol, Ct.
Roland Steel Co., Inc., 114 Liberty Street, N. Y. C.

BANDS—Steel
Akron-Selle Co., Akron, Ohio
Central Alloy Steel Corp., Massillon, Ohio
Bethlehem Steel Company, Bethlehem, Pa.
Sharon Steel Hoop Co., Sharon, Pa.

BARGES—Steel
American Bridge Co., 71 Broadway, N. Y. C.

BARRELS—Burnishing
Abbott Ball Co., 1047 New Britain Ave., Hartford, Conn.
Baird Machine Co., Bridgeport, Conn.
Globe Mach. & Stpg. Co., Cleveland, O.

BARRELS—Steel Shop
Cleveland Wire Spring Co., Cleveland, O.

BARRELS—TUMBLING—See Tumbling Barrels

BARS—Alloy
Central Alloy Steel Corp., Massillon, Ohio
United Alloy Steel Corp., Canton, O.

BARS—Concrete, Reinforcing
Bethlehem Steel Company, Bethlehem, Pa.
Gulf States Steel Co., St. Louis, Mo.
Laclede Steel Co., St. Louis, Mo.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Truscon Steel Co., Youngstown, Ohio.

BARS—Iron and Steel
Ames, W. & Co., Jersey City, N. J.
Bethlehem Steel Company, Bethlehem, Pa.
Buffalo Bolt Company, N. Tonawanda, N. Y.
Carnegie Steel Co., Pittsburgh, Pa.

THIS index is a comprehensive guide to sources of supply.

Each company listed is represented with an advertisement for your use in obtaining information.

Use the list and consult the advertisements.

—See Alphabetical Index— Pages 198-200

De Coo, Richard, Company, Philadelphia, Pa.
Illinois Steel Co., Chicago, Ill.
Interstate Iron & Steel Co., Chicago, Ill
Nicetown Plate Washer Co., Inc., Phila., Pa.
Pacific Coast Steel Co., San Francisco, Cal.
Philadelphia Steel & Iron Co., Phila., Pa.
Potts, Horace T., & Co., Philadelphia, Pa.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

BARS—Manganese Steel
Manganese Steel Forge Co., Philadelphia, Pa.

BEAMS—See Angles, Beams, Channels and Tees

BEARING METAL
Bunting Brass & Bronze Co., Toledo, Ohio.
Fredericksen Company, Saginaw, Mich
Magnolia Metal Co., 75 West St., N. Y. C.
Stewart Die Casting Corp., Chicago, Ill.

BEARINGS—Babbitt
Bunting Brass & Bronze Co., Toledo, Ohio.
Franklin Die-Casting Corp., Syracuse, N. Y.

BEARINGS—Ball
Aetna Ball Bearing Mfg. Co., Chicago, Ill.
American Roller Bearing Co., Pittsburgh, Pa.
Auburn Ball Bearing Co., Rochester, N. Y.
Bantam Ball Bearing Co., Bantam, Conn.
Fafnir Bearing Company, New Britain, Ct.
Hyatt Roller Bearing Co., Newark, N. J.
New Departure Mfg. Co., Bristol, Conn.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Standard Machinery Co., Auburn, R. I.
Torrington Co., Torrington, Conn.

BEARINGS—Brass and Bronze
Bunting Brass & Bronze Co., Toledo, Ohio.
Columbia Mch. Works & Malleable Iron Co., 269 Chestnut St., Brooklyn, N. Y.
Fredericksen Company, Saginaw, Mich.
Lumen Bearing Co., Buffalo, N. Y.
Stewart Die Casting Corp., Chicago, Ill.

BEARINGS—Oilless
Rhondes, R. W., Metaline Co., Inc., Long Island City, N. Y.

BEARINGS—Roller
American Roller Bearing Co., Pittsburgh, Pa.
Bantam Ball Bearing Co., Bantam, Conn.
Hyatt Roller Bearing Co., Newark, N. J.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Roller Bearing Co. of America, Newark, N. J.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Standard Machinery Co., Auburn, R. I.

BEARINGS—Roller Tapered
Bantam Ball Bearing Co., Bantam, Conn.

BEARINGS—Shaft Hanger
Fafnir Bearing Company, New Britain, Ct.

BEARINGS—Thrust
Aetna Ball Bearing Mfg Co., Chicago, Ill.
Bantam Ball Bearing Co., Bantam, Conn.
Fafnir Bearing Co., New Britain, Ct.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Standard Mchry. Co., Auburn, R. I.

BELTING—Chain
Cross Engineering Co., Carbondale, Pa.
Morse Chain Co., Ithaca, N. Y.

BELTING—Leather
Chicago Rawhide Mfg. Co., 1313 Elston Ave., Chicago, Ill.
Ullman, Jacob, Buffalo, N. Y.

BELTING—Rubber
New York Belting & Packing Co., 91-93 Chambers St., New York City.
Robins Conveying Belt Co., Passaic, N. J.

BENCHES—Draw—See Wire Drawing Machinery

BENDING MACHINES—Angle or Eye
Thomas Spacing Mch. Co., Pittsburgh, Pa.

BENDING MACHINES—Hand and Power
Chambersburg Engrg. Co., Chambersburg, Pa.
Cleveland Punch & Shear Wks. Co., Cleve., O.
Dreis & Krump Mfg. Co., Chicago, Ill.
Kane & Roach, Syracuse, N. Y.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

BILLETS—Forging
Andrews Steel Co., Newport, Ky.
Central Alloy Steel Corp., Massillon, Ohio
Pacific Coast Steel Co., San Francisco, Cal.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

BILLETS—Nickel Steel
Central Alloy Steel Corp., Massillon, Ohio
Bethlehem Steel Company, Bethlehem, Pa.

BILLETS—Rerolling
Andrews Steel Co., Newport, Ky.

BILLETS—Steel
American Tube & Stpg. Plant, The (The Stanley Works), Bridgeport, Ct.
Bethlehem Steel Co., Bethlehem, Pa.
Central Alloy Steel Corp., Massillon, Ohio
Columbia Steel Co., Pittsburgh, Pa.
Tenn. Coal, Iron & R.R. Co., Birmingham, Ala.
United Alloy Steel Corp., Canton, O.
Wood, Alan, Iron & Steel Co., Phila., Pa.

BLANKS—Chisel
Chicago Pneumatic Tool Co., 6 E. 44th St., New York City
Cleveland Steel Tool Co., Cleveland, Ohio.

BLANKS—Gear and Pinion
Chicago Rawhide Mfg. Co., 1313 Elston Ave., Chicago, Ill.
National Forge & Tool Co., Irvine, Pa.

BLOCKS—Chain
Chisholm-Moore Mfg. Co., Cleveland, Ohio.
Ford Chain Block Co., Philadelphia, Pa.
Wright Mfg. Co., Lisbon, O.

BLOWERS—Centrifugal
General Electric Co., Schenectady, N. Y.
Sterling Blower Co., Hartford, Conn.

BLOWERS—Pressure
Buffalo Forge Co., 492 B'way, Buffalo, N. Y.
Champion Blower & Forge Co., Lancaster, Pa.
Chicago Flexible Shaft Co., Chicago, Ill.
Spencer Turbine Co., Hartford, Ct.

BLOWERS—Rotary
Connersville Blower Co., Connersville, Ind.
Roots, P. H., & F. M., Co., Connersville, Ind.

BLUE PRINT MACHINES
Wickes Brothers, Saginaw, Mich.

BOILER HEADS—Flanged and Dished
Bethlehem Steel Co., Bethlehem, Pa.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

BOILER SHELLS—Riveted or Welded
Scaife, Wm. B., & Sons Co., Pittsburgh, Pa.

BOILER TRIMMINGS
Crane Co., Chicago, Ill.

BOILERS—Return Tubular
Sotter Bros., Inc., Pottstown, Pa.

BOILERS—Second-hand
Harris Bros. Co., Chicago, Ill.
Hooper-Momberger Co., 90 West St., N. Y. C.
Randle Machinery Co., Cincinnati, O.
Regent Steel Co., Cleveland, Ohio.

BOILERS—Waste Heat
Babcock & Wilcox Co., The, 85 Liberty St., New York City.
Wickes Boiler Co., Saginaw, Mich.

BOILERS—Water Tube
Abendroth & Root Mfg. Co., Newburgh, N. Y.
Babcock & Wilcox Co., The, 85 Liberty St., New York City.
Tudor Boiler Mfg. Co., Cincinnati, O.
Wickes Boiler Co., Saginaw, Mich.

BOLT AND NUT MACHINERY
Acme Machinery Co., Cleveland, O.
Economy Engineering Co., The, Willoughby, O.
Landis Machine Co., Inc., Waynesboro, Pa.
Manville, E. J., Mach. Co., Waterbury, Ct.
National Machinery Co., Tiffin, Ohio.
Pawtucket Mfg. Co., Pawtucket, R. I.
Waterbury Farrel Fdry. & Machine Co., Waterbury, Ct.
Williams Tool Corporation, Erie, Pa.

BOLT AND RIVET CLIPPERS
Chicago Pneumatic Tool Co., 6 E. 44th St., New York City.
Porter, H. K., Inc., Everett, Mass.

BOLTS—Eye
Oliver Iron & Steel Corp., Pittsburgh, Pa.

BOLTS—Special
Buffalo Bolt Company, N. Tonawanda, N. Y.
Pawtucket Mfg. Co., Pawtucket, R. I.

BOLTS AND NUTS—Brass and Bronze
Everitt Co., The, Boston, Mass.

BOLTS AND NUTS—Iron and Steel
American Screw Co., Providence, R. I.
Ames, W., & Co., Jersey City, N. J.
Bell, David, Co., Inc., The, Buffalo, N. Y.
Bethlehem Steel Co., Bethlehem, Pa.
Buffalo Bolt Company, N. Tonawanda, N. Y.
Clark Bros. Bolt Co., Milldale, Ct.
Foster Bolt & Nut Co., The, Cleveland, Ohio.
Haskell, Wm. H., Mfg. Co., Pawtucket, R. I.
Merrill Bros., Maspeth, N. Y.
Pawtucket Mfg. Co., Pawtucket, R. I.
Pottsville Bolt Co., Inc., Pottsville, Pa.
Rhode Island Tool Co., Providence, R. I.
Rockford Bolt Co., Rockford, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

BORING, DRILLING AND MILLING MACHINES—Horizontal
Hill, Clarke & Co. of Chicago, 647 W. Washington Blvd., Chicago, Ill.
Landis Tool Co., Waynesboro, Pa.
Lucas Machine Tool Co., Cleveland, O.
McCabe, J. J., Lathe & Machry. Corp., 149 Broadway, New York City.
McCabe & Sheeran Machinery Corp., Room 482, 50 Church St., New York City.
Milwaukee Electric Crane & Mfg. Corp., Milwaukee, Wis.
Niles-Bement-Pond Co., 111 B'way, N. Y. C.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

BORING, DRILLING AND MILLING MACHINES—Vertical
Baker Bros., Inc., Toledo, O.
Bullard Machine Tool Co., Bridgeport, Ct.
Consolidated Mch. Tool Corp. of America, Rochester, N. Y.
Prentiss, Henry, & Co., Inc., 149 B'way, N. Y. C.

BORING BARS
Bullard Machine Tool Co., Bridgeport, Conn.

BORING MACHINES—Car Wheel
Niles-Bement-Pond Co., 111 B'way, N. Y. C.

BORING MACHINES—Cylinder
Baker Bros., Inc., Toledo, O.

BORING MACHINES—Vertical
Bullard Machine Tool Co., Bridgeport, Ct.
Cincinnati Planer Co., The, Cincinnati, O.
Gisholt Machine Company, Madison, Wis.
McCabe, J. J., Lathe & Mchry. Corp., 149 Broadway, New York City.
McCabe & Sheeran Machinery Corp., Room 482, 50 Church St., New York City.
Niles-Bement-Pond Co., 111 B'way, N. Y. C.

BOX STRAPPING AND FASTENERS
De Haven Mfg. Co., 50-54 Columbia Heights, Brooklyn, N. Y.

BOXES—Annealing
Mesta Machine Co., Pittsburgh, Pa.
Union Steel Casting Co., Pittsburgh, Pa.

BOXES—Steel
Cleveland Wire Spring Co., Cleveland, O.
Sterling Wheelbarrow Co., Milwaukee, Wis.

BRAKES—Electric
Clark Controller Co., The, Cleveland, Ohio.
Electric Controller & Mfg. Co., Cleveland, O.

BRAKES—Metal Forming
Cincinnati Shaper Co., The, Cincinnati, O.
Dreis & Krump Mfg. Co., Chicago, Ill.
Loy & Nawrath Division Birmingham Iron Foundry, Derby, Ct.
Minster Machine Co., Minster, O.
Ohl, George A., & Co., Inc., Newark, N. J.
Robinson, J. M., Mfg. Co., Cincinnati, Ohio.
Streine Tool & Mfg. Co., The, New Bremen, O.

BREECHINGS
Lancaster Iron Works, Inc., Lancaster, Pa.

BRICK—Chrome
General Refractories Co., Philadelphia, Pa.
Harbison-Walker Refractories Co., Pittsburgh, Pa.
Lavino, E. J., & Co., Philadelphia, Pa.

BRICK—Fire
Ashland Fire Brick Company, Ashland, Ky.
Crescent Refractories Co., Curwensville, Pa.
General Refractories Co., Philadelphia, Pa
Plibrico Jointless Firebrick Co., Chicago, Ill.
Queens Run Refractories Co., Inc., Lock Haven, Pa.
Stowe-Fuller Refractories Co., The, Cleve., O.
Taylor, Chas., Sons Co., Cincinnati, Ohio.
U. S. Refractories Corp., Mount Union, Pa.
Walsh Fire Clay Prod. Co., St. Louis, Mo.

BRICK—Fire Clay
General Refractories Co., Philadelphia, Pa.
Harbison-Walker Refractories Co., Pittsburgh, Pa.
Taylor, Chas., Sons Co., Cincinnati, O.

BRICK—Insulating
Celite Prod. Co., 11 B'way, N. Y. C.

BRICK—Magnesite
General Refractories Co., Philadelphia, Pa.
Harbison-Walker Refractories Co., Pittsburgh, Pa.
Lavino, E. J., & Co., Philadelphia, Pa.

BRICK—Silica
General Refractories Co., Philadelphia, Pa.
Harbison-Walker Refractories Co., Pittsburgh, Pa
Lavino, E. J., & Co., Philadelphia, Pa.
U. S. Refractories Corp., Mount Union, Pa.

BRIDGE BUILDERS
American Bridge Co., 71 Broadway, N. Y. C.
McClintic-Marshall Company, Pittsburgh, Pa.
Phoenix Iron Company, Philadelphia, Pa.
Shoemaker Bridge Co., Pottstown, Pa.
Virginia Bridge & Iron Co., Roanoke, Va.

BRIDGE OPERATING MACHINERY—Movable
Earle Gear & Mch. Co., Philadelphia, Pa.

BROACHES
American Broach & Mch. Co., Ann Arbor, Mich.
Lapointe Mch. Tool Co., Hudson, Mass.

BROACHING MACHINES
American Broach & Mch. Co., Ann Arbor, Mich.
Chambersburg Engrg. Co., Chambersburg, Pa.
Lapointe Mch. Tool Co., Hudson, Mass.
Oilgear Co., The, 659 Park St., Milwaukee, Wis.
Pawtucket Mfg. Co., Pawtucket, R. I.

BROACHING MACHINES—Hydraulic
American Broach & Mch. Co., Ann Arbor, Mich.

BRONZE—Phosphor
Michigan Smelting & Refining Co., Detroit, Mich.
Phosphor Bronze Smelting Co., Phila., Pa.

BUCKETS—Clamshell
Blaw-Knox Co., Pittsburgh, Pa.
Erie Steel Construction Co., Erie, Pa.
Haiss, Geo., Mfg. Co., Inc., The, 142nd St. & Canal Pl., New York City.
Hayward Co., The, 50 Church St., N. Y. C.
Owen Bucket Co., Cleveland, O.
Williams, G. H., Co., Erie, Pa.

BUCKETS—Dump
Roura Iron Works, Detroit, Mich.

BUCKETS—Electric Motor
Hayward Co., The, 50 Church St., N. Y. C.

BUCKETS—Elevator
Hendrick Mfg. Co., Carbondale, Pa.

BUCKETS—Grab
Brosius, Edgar E., Pittsburgh, Pa.
Brown Hoisting Machry. Co., Cleveland, O.
Browning Crane Co., The, Cleveland, O.
Erie Steel Construction Co., Erie, Pa.
Industrial Works, Bay City, Mich.
Orton Crane & Shovel Co., Chicago, Ill.
Williams, G. H., Co., Erie, Pa.

BUCKETS—Orange Peel
Hayward Co., The, 50 Church St., N. Y. C.
Orton Crane & Shovel Co., Chicago, Ill.

BUCKLES—Bale, Tie
Joliet Wrought Washer Company, Joliet, Ill.

BUILDINGS—Factory
Austin Co., The, Cleveland, Ohio.
Eddy, E. A., Mchry. Co., The, Providence, R. I.
Ferguson, H. K., Company, Cleveland, O.
Lane, H. M., Co., Detroit, Mich.
Technical Service Co., Woolworth Bldg., N.Y.C.

BUILDINGS—Steel
American Bridge Co., 71 Broadway, N. Y. C.
Austin Co., The, Cleveland, Ohio.
Belmont Iron Works, Philadelphia, Pa.
Berlin Construction Co., Inc., Berlin, Ct.
Blaw-Knox Co., Pittsburgh, Pa.
De Cou, Richard, Company, Philadelphia, Pa.
Ferguson, H. K., Company, Cleveland, O.
Greenspon's, Jos., Sons, Iron & Steel Co., St. Louis, Mo.
McClintic-Marshall Co., Pittsburgh, Pa.
Shoemaker Bridge Co., Pottstown, Pa.
Truscon Steel Co., Youngstown, O.

BULLDOZERS
Beatty Machine & Mfg. Co., Hammond, Ind.
Williams, White & Co., Moline, Ill.

BUNKERS—Coal
Lancaster Iron Works, Inc., Lancaster, Pa.

BURNERS—Combination Oil and Gas
Anthony Co., The, Long Island City, N. Y.
Surface Combustion Co., 366-368 Gerard Ave., Bronx, N. Y.

BURNERS—Enclosed Flame Gas
Oven Equipment & Mfg. Co., New Haven, Ct.

BURNERS—Oil
Anthony Co., The, Long Island City, N. Y.
Best, W. N., Corp., 11 Broadway, N. Y. C.
Economy Furnace Co., The, Chicopee, Mass.
Hauck Mfg. Co., 128 Tenth St., Brooklyn, N.Y.

BURRS—Steel
Wrought Washer Mfg. Co., Milwaukee, Wis.

BUSHINGS—Brass and Bronze
Bunting Brass & Bronze Co., Toledo, O.
Columbia Mch. Works & Malleable Iron Co., 269 Chestnut St., Brooklyn, N. Y.
Keystone Bronze Co., Pittsburgh, Pa.

BUSHINGS—Phosphor Bronze
Phosphor Bronze Smelting Co., Phila., Pa.

CABLE—Electric
General Electric Co., Schenectady, N. Y.

CABLEWAYS AND TRAMWAYS — See Tramways

CALORIMETERS—Coal or Gas Recording
Smith Gas Engineering Co., Dayton, O.

CARBIDE
Air Reduction Sales Co., 342 Madison Ave., New York City.

CARBONIZING—See Heat Treating

CAR DUMPERS
Wellman-Seaver-Morgan Co., Cleveland, O.

CARS—Dump
Atlas Car & Mfg. Co., Cleveland, O.

CARS—Industrial and Mining
Atlas Car & Mfg. Co., Cleveland, O.
Chase Foundry & Mfg. Co., Columbus, O.

CASE HARDENING—See Heat Treating

CASE HARDENING AND TEMPERING COMPOUNDS
Anti-Borax Compound Co., Ft. Wayne, Ind.

CASTINGS—Abrasive Resisting
Era Steel Co., Bucyrus, Ohio.

CASTINGS—Acid or Heat Resisting
Hoskins Mfg. Co., Detroit, Mich.

CASTINGS—Alloy Steel
Alloy Cast Steel Co., The, Marion, Ohio.
Chicago Steel Fdry. Co., Chicago, Ill.
Era Steel Co., Bucyrus, Ohio.

CASTINGS—Brass, Bronze or Aluminum
Aluminum & Brass Co., Lockport, N. Y.
Barr, William H., Inc., Buffalo, N. Y.
Bethlehem Steel Company, Bethlehem, Pa.
Buffalo Bronze Die Cast Corp., Buffalo N. Y.
Cadman, A. W., Mfg. Co., Pittsburgh, Pa.
Caldwell, E. R., & Son, Brass Co., 620 W. Fayette St., Syracuse, N. Y.
Columbia Mch. Works & Malleable Iron Co., 269 Chestnut St., Brooklyn, N. Y.
Douglas & Lomason Co., Detroit, Mich.
Enterprise Brass Works, Muskegon Heights, Mich.
Franklin Die-Casting Corp., Syracuse, N. Y.
Greensburg Tool & Mch. Co., Greensburg, Pa.
Keystone Bronze Co., Pittsburgh, Pa.
Lumen Bearing Co., Buffalo, N. Y.
Marf Machine & Die Casting Co., 20 Bush Terminal, Brooklyn, N. Y.
Medina Stpg. & Machine Co., Medina, N. Y.
Metal & Alloy Specialties Co., Inc., Buffalo, N. Y.
Mt. Vernon Die Casting Corp., Mt. Vernon, N. Y.
Phosphor Bronze Smelting Co., Phila., Pa.
Sherwood Mfg. Co., Buffalo, N. Y.
Shoop Bronze Co., Tarentum, Pa.
Spencer's, I. S., Sons, Inc., Guilford, Ct.
Springfield Bronze Co., Springfield, Mass.
Sterling Die Casting Co., Inc., 741 39th St., Brooklyn, N. Y.

CASTINGS—Crucible Steel
Dycast Steel Co., Collinsville, Ct.

CASTINGS—Die
Dycast Steel Co., Collinsville, Ct.
Franklin Die-Casting Corp., Syracuse, N. Y.
Marf Machine & Die Casting Co., 20 Bush Terminal, Brooklyn, N. Y.
Michigan Smelting & Refining Co., Detroit, Mich.
Mt. Vernon Die Casting Corp., Mt. Vernon, N. Y.
Soss Mfg. Co., Grand Ave. & Bergen St., Brooklyn, N. Y.
Sterling Die Casting Co., Inc., 741 39th St., Brooklyn, N. Y.
Stewart Die Casting Corp., Chicago, Ill.

CASTINGS—Electric Steel
Alloy Cast Steel Co., The, Marion, Ohio.
American Steel Foundries, Chicago, Ill.
Chicago Steel Fdry. Co., Chicago, Ill.
Crucible Steel Casting Co., Cleveland, O.
Empire Steel Casting Co., Frush Valley, Reading, Pa.
Industrial Steel Casting Co., The, Toledo, O.
Maynard Electric Steel Casting Co., Milwaukee, Wis.
Monroe Steel Castings Co., Monroe, Mich.
Smith, Geo. H., Steel Casting Co., Milwaukee.
Trenawell Engineering Co., Easton, Pa.

CASTINGS—Gray Iron
Adamson Machine Co., Akron, Ohio.
American Engineering Co., Aramingo & Cumberland Sts., Philadelphia, Pa.
Athens Foundry Co., Athens, Pa.
Bethlehem Steel Company, Bethlehem, Pa.
Chambersburg Engrg. Co., Chambersburg, Pa.
Columbia Mch. Works & Malleable Iron Co., 269 Chestnut St., Brooklyn, N. Y.
Connecticut Foundry Co., The, Rocky Hill, Conn.
De Mattia Foundry & Mch. Co., Clifton, N. J.
Fairmount Foundry, Inc., Philadelphia, Pa.
Frederick Iron & Steel Co., Frederick, Md.
Glens Falls Mach. Works, Glens Falls, N. Y.
Gray Iron Foundry Co., Reading, Pa.
Hay Foundry & Iron Works, Newark, N. J.
Hershey Mch. & Fdry. Co., Manheim, Pa.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Jenkins Machine Co., Sheboygan Falls, Wis.
Kline Hardware Co., Allentown, Pa.
Mackintosh-Hemphill Company, Pittsburgh, Pa.
Newark Malleable Iron Works, Louis Sacks, Inc., Newark, N. J.
North Wales Mach. Co., Inc., North Wales, Pa.
Osborn Mch. Co., Du Bois, Pa.
Patch, F. R., Manufacturing Co., Rutland, Vt.
Penn Fdry. & Mfg. Co., Box 182, Reading, Pa.
Pennsylvania Engrg. Works, New Castle, Pa.
Sessions Foundry Company, The, Bristol, Ct.
Spencer's, I. S., Sons, Inc., Guilford, Ct.
Standard Engineering Co., Ellwood City, Pa.
Struthers-Wells Co., Warren, Pa.
Stuart & Peterson Co., The, Burlington, N. J.
Sweet & Doyle Fdry. & Mch. Co., Troy, (Green Island), N. Y.
Swett, A. L., Iron Wks., 139 Glenwood Ave., Medina, N. Y.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.
Toledo Mch. & Tool Co., Toledo, O.
Turner & Seymour Mfg. Co., Torrington, Ct.
Union Mfg. Co., New Britain, Ct.
U. S. Cast Iron Pipe & Fdry. Co., Burlington, N. J.
Walworth Run Foundry Co., Cleveland, O.
Wheeling Mold & Fdry. Co., Wheeling, W. Va.
Xenia Fdry. & Mch. Co., Xenia, Ohio.

CASTINGS—Malleable
Berger Bros., Co., Philadelphia, Pa.
Berryhill Malleable Iron Co., Evansville, Ind.
Cadillac Malleable Iron Co., Cadillac, Mich.
Canton Malleable Iron Co., Canton, Ohio.
Danville Malleable Iron Co., Danville, Ill.
Eberhard Mfg. Co., Cleveland, Ohio.
Flagg, Stanley G., & Co., Inc., Phila., Pa.
Fort Pitt Malleable Iron Co., Pittsburgh, Pa.
Haven Malleable Castings Co., The, Cincinnati, Ohio.
Lakeside Malleable Castings Co., Racine, Wis.
Link-Belt Co., 200 So. Belmont St., Indianapolis, Ind.
Malleable Iron Fittings Co., Branford, Ct.
Marion Malleable Iron Works, Marion, Ind.
Meeker Foundry Company, Newark, N. J.
Newark Malleable Iron Works, Louis Sacks, Inc., Newark, N. J.
Northern Malleable Iron Co., St. Paul, Minn.
Peoria Malleable Castings Co., Peoria, Ill.
Philadelphia Hardware & Malleable Iron Wks., Inc., Philadelphia, Pa.
Richmond Malleable Casting Co., Richmond, Ind.
Temple Malleable Iron & Steel Co., Phila., Pa.
Vermilion Malleable Iron Co., Hoopeston, Ill.

CASTINGS—Manganese Steel
Alloy Cast Steel Co., The, Marion, Ohio.
Era Steel Co., Bucyrus, Ohio.

CASTINGS—Open Hearth Steel
Commercial Steel Casting Co., Marion, Ohio.

CASTINGS—Semi-Steel
Chambersburg Engrg. Co., Chambersburg, Pa.
Malleable Iron Fittings Co., Branford, Ct.

CASTINGS—Stainless Steel
Firth, Thos., & Sons, Inc., Hartford, Ct.

CASTINGS—Steel
Adamson Mach. Co., The, Akron, O.
Allegheny Steel Co., Brackenridge, Pa.
Alloy Cast Steel Co., The, Marion, Ohio.
American Steel Foundries, Chicago, Ill.
Atlantic Steel Castings Co., Chester, Pa.
Atlas Steel Casting Co., Buffalo, N. Y.
Bethlehem Steel Company, Bethlehem, Pa.
Birdsboro Steel Fdry. & Mch. Co., Birdsboro, Pa.
Cann & Saul Steel Co., Philadelphia, Pa.
Chicago Steel Foundry Co., Chicago, Ill.
Cincinnati Steel Castings Co., Cincinnati, O.
Commercial Steel Casting Co., Marion, Ohio.
Crucible Steel Casting Co., Cleveland, O.
Crucible Steel Casting Co., Lansdowne, Pa.
Deemer Steel Casting Co., New Castle, Del.
Dycast Steel Co., Collinsville, Conn.
Era Steel Co., Bucyrus, Ohio.
Falk Corp., Milwaukee, Wis.
Federal Steel Fdry. Co., Chester, Pa.
Industrial Steel Casting Co., The, Toledo, O.
Malleable Iron Fittings Co., Branford, Ct.
Maynard Electric Steel Castings Co., Milwaukee, Wis.
Mesta Machine Co., Pittsburgh, Pa.
Philadelphia Roll & Mach. Co., Phila., Pa.
Reading Steel Casting Co., Inc., Reading, Pa.
Sharon Foundry Co., Sharon, Pa.
Smith, Geo. H., Steel Casting Co., Milwaukee, Wis.
Stroh Steel-Hardening Process Co., Pittsburgh, Pa.
Strong Steel Fdry. Co., Buffalo, N. Y.
Temple Malleable Iron & Steel Co., Phila., Pa.
Union Steel Casting Co., Pittsburgh, Pa.
Wharton, William, Jr., & Co., Inc., Easton, Pa.
Wheeling Mold & Fdry Co., Wheeling, W. Va.

CEMENT—Fire Brick
Botfield Refractories Co., Phila., Pa.

CEMENT—Fire Resisting
Botfield Refractories Co., Phila., Pa.
Harbison-Walker Refractories Co., Pittsburgh, Pa.

CEMENT—Quick Setting, Acid Proof and Insulator
Nukem Products Corp., 93 Rapin St., Buffalo, N. Y.

CEMENT—Silica and Chrome
General Refractories Co., Philadelphia, Pa.
Harbison-Walker Refractories Co., Pittsburgh, Pa.

CEMENT—High Temperature
Botfield Refractories Co., Phila., Pa.

CEMENT—Refractory
Botfield Refractories Co., Phila., Pa.

CEMENT ROOFING TILE
American Cement Tile Mfg. Co., Pittsburgh, Pa.
Federal Cement Tile Co., Chicago, Ill.

CENTERING MACHINES
Niles-Bement-Pond Co., 111 B'way, N. Y. C.
Whiton, D. E., Mach. Co., New London, Ct.

CENTERS—Index
Simmons Mach. Tool Corp., Albany, N. Y.

CHAIN MACHINERY
Vaughn Machinery Co., Cuyahoga Falls, O.

CHAINS—Cable
Morton, Thomas, 245 Centre St., N. Y. C.

CHAINS—Coil
American Chain Company, Inc., Bridgeport, Ct.
Bradlee & Co., Philadelphia, Pa.
Carr Chainworks, Inc., Troy, N. Y.

CHAINS—Conveyor
Brown Hoisting Machry. Co., Cleveland, O.
Link-Belt Co., Chicago, Ill.
Webster Mfg. Co., Chicago, Ill.

CHAINS—Crane and Hoist
Bradlee & Co., Philadelphia, Pa.
Carr Chainworks, Inc., Troy, N. Y.

CHAINS—Dredge
American Chain Company, Inc., Bridgeport, Ct.
Carr Chainworks, Inc., Troy, N. Y.

CHAINS—Machinery
Morse Chain Co., Ithaca, N. Y.

CHAINS—Power Transmission
American High Speed Chain Co., Indianapolis, Ind.
Howe Chain Co., Muskegon, Mich.
Link-Belt Co., Chicago, Ill.
Morse Chain Co., Ithaca, N. Y.
Union Chain & Mfg. Co., Sandusky, O.
Webster Mfg. Co., Chicago, Ill.

CHAINS—Rocker-Joint
Morse Chain Co., Ithaca, N. Y.

CHAINS—Sash
Morton, Thos., 245 Centre St., N. Y. C.

CHAINS—Sling
Reading Chain & Block Corp., Reading, Pa.

CHAINS—Sprocket Wheel
American High Speed Chain Co., Indianapolis, Ind.
Cullman Wheel Co., Chicago, Ill.
Morse Chain Co., Ithaca, N. Y.
Union Chain & Mfg. Co., Sandusky, O.
Webster Mfg. Co., Chicago, Ill.
Whitney Mfg. Co., Hartford, Ct.

CHANNELS—See Angles, Beams, Channels and Tees

CHAPLETS
Erdle Perforating Co., Rochester, N. Y.

CHASERS
Jones & Lamson Mach. Co., Springfield, Vt.

CHECKS—Metal
Schwerdtle Stamp Co., Bridgeport, Ct.

CHIMNEYS—Steel
Lancaster Iron Works, Inc., Lancaster, Pa.

CHUCKING MACHINES—Automatic
Baird Mach. Co., Bridgeport, Ct.
Goss & DeLeeuw Machine Co., New Britain, Conn.

CHUCKING MACHINES—Multiple Spindle
Goss & DeLeeuw Machine Co., New Britain, Conn.
National Acme Co., Cleveland, Ohio.

CHUCKS—Drill
Cleveland Twist Drill Co., Cleveland, O.
McCrosky Tool Corp., Meadville, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Union Mfg. Co., New Britain, Ct.

CHUCKS—Lathe
Hoggson & Pettis Mfg. Co., New Haven, Conn.
Union Mfg. Co., New Britain, Conn.
Whiton, D. E., Mch. Co., New London, Conn.

CHUCKS—Magnetic
Heald Mch. Co., Worcester, Mass.

CLEANER—Metal
American Chemical Paint Co., Ambler, Pa.
Ford, J. B., Co., Wyandotte, Mich.
Nukem Products Corp., 93 Rapin St., Buffalo N. Y.
Oakite Products, Inc., 22 Thames St., New York City.

CLEANING MATERIALS
American Chemical Paint Co., Ambler, Pa.
Ford, J. B., Co., Wyandotte, Mich.
Oakite Products, Inc., 22 Thames St., New York City.

CLEANING MATERIALS—Glass
Nukem Products Corp., 93 Rapin St., Buffalo, N. Y.
Skybryte Co., The, Cleveland, Ohio.

CLEANING STARS
Canton Malleable Iron Co., Canton, Ohio.

CLUTCHES—Friction
Brown Engineering Co., Reading, Pa.
Caldwell, W. E., Co., 260 Brandeis Street, Louisville, Ky.
Conway Clutch Co., 1948 W. 6th St., Cincinnati, O.
Falls Clutch & Mchry. Co., Kent, O.
Johnson, Carlyle, Machine Co., Manchester, Ct.
Jones, W. A., Foundry & Mach. Co., 4434 W. Roosevelt Road, Chicago, Ill.
Moore & White Co., Philadelphia, Pa.
Schultz, A. L., & Son, Chicago, Ill.

COAL
Cleveland-Cliffs Iron Co., Cleveland, Ohio.
North American Coal Corp., The, Cleveland, Ohio.
Pilling & Co., Inc., Philadelphia, Pa.
Pittsburgh Coal Co., Pittsburgh, Pa.
Snyder, W. P., & Co., Pittsburgh, Pa.

COAL, ORE AND ASH HANDLING MACHINERY
Alliance Machine Co., Alliance, O.
Bartlett, C. O., & Snow Co., Cleveland, O.
Brown Hoisting Machry. Co., Cleveland, O.
Hayward Co., The, 50 Church St., N. Y. C.
Link-Belt Co., Chicago, Ill.
McMyler-Interstate Co., Cleveland, Ohio.
Northern Engineering Works, 212 Chene St., Detroit, Mich.
Orton Crane & Shovel Co., Chicago, Ill.
Webster Mfg. Co., Chicago, Ill.

COCKS—Air and Gas
Crane Co., Chicago, Ill.

COILING MACHINES — Flexible Shaft, Metallic Tube and Casing
Sleeper & Hartley Inc., Worcester, Mass.

COILS—Armature and Field
Columbia Mch. Works & Malleable Iron Co., 269 Chestnut St., Brooklyn, N. Y.

COKE—Metallurgical
Bethlehem Steel Company, Bethlehem, Pa.
Cleveland-Cliffs Iron Co., Cleveland, Ohio.
Hillman Coal & Coke Co., Pittsburgh, Pa.
Rogers Brown & Crocker Bros., Inc., 21 East 40th St., New York City.
St. Louis Coke & Iron Corp., Chicago, Ill.
Snyder, W. P., & Co., Pittsburgh, Pa.
Stewart Furnace Co., The, Cleveland, O.
Tutein, E. Arthur, Inc., Boston, Mass.
Waldo, Egbert & Maltby, Inc., Buffalo, N. Y.
Walter-Wallingford & Co., Cincinnati, O.

COKE-OVEN MACHINERY
Alliance Machine Co., Alliance, O.
Atlas Car & Mfg. Co., Cleveland, O.

COKE OVENS—By-Products
Smythe, S. R., Co., Inc., The, Pittsburgh, Pa.

COLD DRAWING MACHINES—Bar & Wire
Standard Engineering Co., Ellwood City, Pa.
Vaughn Mchry. Co., Cuyahoga Falls, O.

COLLARS—Spacing for Milling Cutters
Detroit Stamping Co., Detroit, Mich.

COMPRESSORS—Air
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Bury Compressor Co., Erie, Pa.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York City.
De Laval Steam Turbine Co., Trenton, N. J.
General Electric Co., Schenectady, N. Y.
Ingersoll-Rand Co., 11 Broadway, N. Y. C.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Spencer Turbine Co., Hartford, Ct.
Sullivan Mchry. Co., Chicago, Ill.
Worthington Pump & Mchry. Corp., 115 B'way, New York City.

COMPRESSORS—Gas
Bury Compressor Co., Erie, Pa.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York City.
Ingersoll-Rand Co., 11 B'way, N. Y. C.
Worthington Pump & Mchry. Corp., 115 B'way, New York City.

CONCRETE CONSTRUCTION
Austin Co., The, Cleveland, Ohio.
Ferguson, H. K., Company, Cleveland, O.

CONCRETE CRIBBING—Precast
R. C. Products Co., Cleveland, Ohio.

CONCRETE MACHINERY
Ideal Concrete Mchry. Co., Cincinnati, O.
Knickerbocker Co., Jackson, Mich.

CONCRETE REINFORCEMENT
American Steel & Wire Co., Chicago, Ill.

CONCRETE ROOFING TILE
American Cement Tile Mfg. Co., Pittsburgh, Pa.
Federal Cement Tile Co., Chicago, Ill.

CONCRETE UNITS—Miscellaneous
R. C. Products Co., Cleveland, Ohio.

CONDENSERS—Surface and Jet
Dean Bros. Co., Indianapolis, Ind.
Ingersoll-Rand Co., 11 Broadway, N. Y. C.
U. S. Cast Iron Pipe & Fdry. Co., Burlington, N. J.
Worthington Pump & Mchry. Corp., 115 B'way, New York City.

CONDUITS—Flexible Metallic
Pennsylvania Flexible Metallic Tubing Co., Philadelphia, Pa.

CONTRACTORS—General
Austin Co., The, Cleveland, Ohio.

CONTRACTORS' SUPPLIES—Second-hand
Albert & Davidson Pipe Corp., 256-264 Oakland St., Brooklyn, N. Y.

CONTROLLERS—Crane
Clark Controller Co., The, Cleveland, Ohio.
Electric Controller & Mfg. Co., Cleveland, O.

CONTROLLERS—Electric
Electric Controller & Mfg. Co., Cleveland, O.
General Electric Co., Schenectady, N. Y.

CONTROLLERS—Electric Motor
Clark Controller Co., The, Cleveland, Ohio.
Electric Controller & Mfg. Co., Cleveland, O.

CONTROLLERS—Temperature
Bristol Co., Waterbury, Ct.
Wilson-Maeulen Co., Inc., 738 E. 143rd St., New York City.

CONVEYING AND ELEVATING MACHINERY
Bartlett, C. O., & Snow Co., Cleveland, O.
Brown Hoisting Machry. Co., Cleveland, O.
Link-Belt Co., Chicago, Ill.
Portable Machinery Co., Passaic, N. J.
Robins Conveying Belt Co., Passaic, N. J.

CONVEYORS—Portable
Haiss, Geo., Mfg. Co., Inc., The, 142d St., & Canal Pl., N. Y. C.
Portable Machinery Co., Passaic, N. J.

COOLING DEVICES—Furnace
Blaw-Knox Co., Pittsburgh, Pa.

COPING MACHINES
Cleveland Punch & Shear Wks. Co., Cleveland, Ohio.

CORE BREAKERS—Pneumatic
Sullivan Mchry. Co., Chicago, Ill.

CORNICE BRAKES
Dreis & Krump Mfg. Co., Chicago, Ill.

CORUNDUM WHEELS — See Grinding Wheels

COTTERS AND KEYS—Spring
Hindley Mfg. Co., Valley Falls, R. I.
Hubbard, M. D., Spring Co., Pontiac, Mich.

COUNTERBORES
Cleveland Twist Drill Co., Cleveland, O.
Morse Twist Drill & Mch. Co., New Bedford, Mass.

COUNTING MACHINES
Durant Manufacturing Co., Milwaukee, Wis.
Hart, R. E., Mfg. Co., Battle Creek, Mich.
Root Co., Bristol, Conn.
Veeder Mfg. Co., Hartford, Ct.

COUPLINGS—Air Hose
Cleveland Pneumatic Tool Co., The, Cleve., O.

COUPLINGS—Cut-off, Friction
Johnson, Carlyle, Mach. Co., Manchester, Ct.
Moore & White Co., Philadelphia, Pa.

COUPLINGS—Flexible Shaft
Brown Engineering Co., Reading, Pa.
Clark Controller Co., The, Cleveland, O.
Electric Controller & Mfg. Co., Cleveland, O.
Thompson Brothers, Philadelphia, Pa.

COUPLINGS—Friction Clutch
Caldwell, W. E., Co., 260 Brandeis Street, Louisville, Ky.
Conway Clutch Co., 1948 W. 6th St., Cincinnati, O.
Falls Clutch & Mchry. Co., Kent, O.
Johnson, Carlyle, Mach. Co., Manchester, Ct.
Jones, W. A., Foundry & Mach. Co., 4434 W. Roosevelt Road, Chicago, Ill.

COUPLINGS—Shaft
Falk Corp., Milwaukee, Wis.
Falls Clutch & Mchry. Co., Kent, O.
Jones, W. A., Foundry & Mach. Co., 4434 W. Roosevelt Road, Chicago, Ill.
Nicholson, W. H., & Co., 115 Oregon St., Wilkes-Barre, Pa.

CRANES—Crawling Tractor
Browning Crane Co., The, Cleveland, O.
Harnischfeger Corp., Milwaukee, Wis.
Industrial Works, Bay City, Mich.
Link-Belt Co., Chicago, Ill.

CRANES—Electric Traveling
Alliance Machine Co., Alliance, O.
Bedford Foundry & Machine Co., Bedford, Ind.
Box Crane & Hoist Corp., Phila., Pa.
Chisholm-Moore Mfg. Co., Cleveland, Ohio.
Cleveland Crane & Engrg. Co., Wickliffe, O.
Euclid Crane & Hoist Co., Euclid, Ohio.
Harnischfeger Corp., Milwaukee, Wis.
Maris Brothers, Inc., Philadelphia, Pa.
Milwaukee Electric Crane & Mfg. Corp., Milwaukee, Wis.
Morgan Engineering Co., Alliance, O.
Niles-Bement-Pond Co., 111 Broadway, N.Y.C.
Northern Engineering Works, 212 Chene St., Detroit, Mich.
Payne, N. B., & Co., 25 Church St., N. Y. C.
Roeper Crane & Hoist Works, Inc., Reading, Pa.
Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.
Toledo Crane Co., The, Bucyrus, O.

CRANES—Gantry
Cleveland Crane & Engrg. Co., Wickliffe, O.
Industrial Works, Bay City, Mich.
Niles-Bement-Pond Co., 111 B'way, N. Y. C.

CRANES—Hand Power
Alliance Machine Co., Alliance, O.
Armington Engineering Co., Euclid, O.
Bedford Foundry & Machine Co., Bedford, Ind.
Box Crane & Hoist Corp., Inc., Phila., Pa.
Chisholm-Moore Mfg. Co., Cleveland, Ohio.
Cleveland Crane & Engrg. Co., Wickliffe, O.
Maris Brothers, Inc., Philadelphia, Pa.
Payne, N. B., & Co., 25 Church St., N. Y. C.
Reading Chain & Block Corp., Reading, Pa.
Toledo Crane Co., The, Bucyrus, O.
Wright Mfg. Co., Lisbon, O.

CRANES—Jib
Box Crane & Hoist Corp., Phila., Pa.
Northern Engineering Works, 212 Chene St., Detroit, Mich.
Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.

CRANES—Locomotive
Brown Hoisting Machry. Co., Cleveland, O.
Browning Crane Co., The, Cleveland, O.
Gelinas, A. R., Montreal, Canada.
Harnischfeger Corp., Milwaukee, Wis.
Industrial Works, Bay City, Mich.
King, Philip T., 50 Church St., N. Y. C.
Link-Belt Co., Chicago, Ill.
McMyler-Interstate Co., Cleveland, Ohio.
Ohio Locomotive Crane Co., Bucyrus, O.
Orton Crane & Shovel Co., Chicago, Ill.

CRANES—Motor Truck
Browning Crane Co., The, Cleveland, O.

CRANES—Portable
Beatty Machine & Mfg. Co., Hammond, Ind.

CRANES—Portable Electric
Elwell-Parker Electric Co., Cleveland, O.

CRANK SHAFTS
Leard, Wm., Co., Inc., New Brighton, Pa.
Union Switch & Signal Co., Swissvale, Pa.

CRIBBING—Concrete
R. C. Products Co., Cleveland, Ohio.

CRIMPING MACHINES
Streine Tool & Mfg. Co., The, New Bremen, O.

CRUCIBLES—Metallurgical
McCullough-Dalzell Crucible Co., Pitts., Pa.
Ross Tacony Crucible Co., Philadelphia, Pa.

CRUCIBLES—Platinum
Baker & Co., Inc., Newark, N. J.

CRUSHERS—Steel Turning
American Crusher & Machinery Corp., 1440 Broadway, New York City.
American Pulverizer Co., St. Louis, Mo.

CRUSHERS—Stone
Morgan Engineering Co., Alliance, O.

CUPOLAS—Foundry
Northern Engineering Works, 212 Chene St., Detroit, Mich.
Paxson, J. W., Co., Philadelphia, Pa.

CUTTERS—Bolt
Acme Machinery Co., Cleveland, O.
Landis Mach. Co., Inc., Waynesboro, Pa.
National Machry. Co., Tiffin, O.

CUTTERS—Key Seating
Davis Keyseater Company, Rochester, N. Y.
Whitney Mfg. Co., Hartford, Ct.

CUTTERS—Milling
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Twist Drill Co., Cleveland, Ohio.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
National Twist Drill & Tool Co., Detroit, Mich.
Union Twist Drill Co., Athol, Mass.

CUTTING COMPOUNDS
Oakite Products, Inc., 22 Thames St., N. Y. C.

CUTTING-OFF MACHINES—Pipe
Bignall & Keeler Mach. Works, Edwardsville, Ill.
Etna Machine Co., The, Toledo, O.

CUTTING AND WELDING APPARATUS—Oxy-Acetylene—See Welding and Cutting Machines and Equipment—Oxy-Acetylene

CYLINDERS—Compressed Air, Gas, etc.
National Tube Co., Pittsburgh, Pa.

CYLINDERS—Seamless
National Tube Co., Pittsburgh, Pa.

DERRICKS
American Terry Derrick Co., South Kearny, N. J.
Hayward Co., The, 50 Church St., N. Y. C.
Mallory Machry. Corp., Baltimore, Md.

DIAMOND TOOLS
Desmond-Stephan Mfg. Co., Urbana, O.
Dickinson, Thos. L., 34 Gold St., N. Y. C.

DIAMONDS—Carbon and Bortz (Importers)
Desmond-Stephan Mfg. Co., Urbana, O.

DIE BLOCKS
Bethlehem Steel Company, Bethlehem, Pa.
Heppenstall Forge & Knife Co., Pitts., Pa.
McWilliams, John, & Sons, Jersey City, N. J.
Wetherell Bros. Co., Cambridge, 39, Mass.

DIE-CASTING MACHINE
Lynd-Farquhar Co., Boston, Mass.

DIE SETS
U. S. Tool Co., Inc., Ampere, N. J.

DIES—Bolt Threading
Curtis & Curtis Co., Bridgport, Ct.
Landis Machine Co., Inc., Waynesboro, Pa.

DIES—Drop Forging
Little Giant Company, Mankato, Minn.

DIES—Embossing and Stamping
Bossert Corp., The, Utica, N. Y.
Hoggson & Pettis Mfg. Co., New Haven, Ct.
Schwerdtle Stamp Co., Bridgeport, Ct.

DIES—Gripping and Heading
Marchant, Geo. F., Co., Chicago, Ill.

DIES—Pipe Threading
Bignall & Keeler Mch. Wks., Edwardsville, Ill.
Curtis & Curtis Co., Bridgeport, Ct.

DIES—Screw and Thread Cutting
Eastern Mach. Screw Corp., New Haven, Ct.
Jones & Lamson Machine Co., Springfield, Vt.
Landis Machine Co., Inc., Waynesboro, Pa.
National Acme Co., Cleveland, Ohio.

DIES—Self-Opening Adjustable
Consolidated Mch. Tool Corp. of America, Rochester, N. Y.
Eastern Mach. Screw Corp., New Haven, Ct.
Jones & Lamson Machine Co., Springfield, Vt.
Murchey Mach. & Tool Co., Detroit, Mich.

DIES—Sheet Metal Working
Adriance Machine Works, Inc., 82 Richards St., Brooklyn, N. Y.
Bliss, E. W., Co., 53d St. & 2d Ave., Brooklyn, N. Y.
Cleveland Punch & Shear Wks. Co., Cleve., O.
Harry Brothers Mfg. Co., Detroit, Mich.
Heintz Mfg. Co., Philadelphia, Pa.
Jahn, B., Mfg. Co., The, New Britain, Conn.
Mehl Machine Tool & Die Co., Roselle, N. J.
New England Pressed Steel Co., Natick, Mass.
Superior Tool Wks., Chicago, Ill.
Toledo Mach. & Tool Co., Toledo, O.
V. & O. Press Co., Hudson, N. Y.
Worcester Stamped Metal Co., Worcester, Mass.
Zeh & Habnemann Co., Newark, N. J.

DISCS—Abrasive
Gardner Machine Co., Beloit, Wis.

DOORS AND SHUTTERS—Steel or Wood Rolling
Kinnear Mfg. Co., Columbus, O.

DRAWN WORK—Metal—See Stampings or Drawings—Metal

DRILL HEADS—Multiple
Baker Bros., Inc., Toledo, O.
U. S. Drill Head Co., Cincinnati, Ohio.

DRILLING MACHINES—Automatic
Barnes Drill Co., Rockford, Ill.

DRILLING MACHINES—Bench
Barnes, W. F. & John, Co., Rockford, Ill.
Kingsbury Mfg. Co., Keene, N. H.
Leland-Gifford Co., Worcester, Mass.

DRILLING MACHINES—Horizontal
Baker Bros., Inc., Toledo, O.
Barnes, W. F. & John, Co., Rockford, Ill.
Kingsbury Mfg. Co., Keene, N. H.

DRILLING MACHINES—Multiple Spindle
Baker Bros., Inc., Toledo, O.
Barnes Drill Co., Rockford, Ill.
U. S. Drill Head Co., Cincinnati, Ohio.

DRILLING MACHINES — Multiple Spindle, Adjustable
National Automatic Tool Co., Richmond, Ind.

DRILLING MACHINES — Multiple Spindle, Horizontal
National Automatic Tool Co., Richmond, Ind.

DRILLING MACHINES — Multiple Spindle, Vertical
National Automatic Tool Co., Richmond, Ind.

DRILLING MACHINES—Portable
Cleveland Punch & Shear Wks. Co., Cleve., O.

DRILLING MACHINES—Portable Electric
Chicago Pneumatic Tool Co., 6 E. 44th St., New York City.
U. S. Electrical Tool Co., The, Cincinnati, O.
Van Dorn Electric Tool Co., Cleveland, Ohio.

DRILLING MACHINES—Portable Pneumatic
Buckeye Portable Tool Co., The, Dayton, Ohio.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York City.
Cleveland Pneumatic Tool Co., The, Cleve., O.
Ingersoll-Rand Co., 11 B'way, New York City.

DRILLING MACHINES—Radial
American Tool works Co., Cincinnati, O.
Cincinnati Bickford Tool Co., Cincinnati, O.
Cleveland Punch & Shear Wks. Co., Cleve., O.
Niles-Bement-Pond Co., 111 B'way, N. Y. C.
Reed-Prentice Corp., Worcester, Mass.
Ryerson, Jos. T. & Son, Inc., Chicago, Ill.
Taylor & Fenn Co., Hartford, Ct.

DRILLING MACHINES—Rock
Chicago Pneumatic Tool Co., 6 E. 44th St., New York City.
Ingersoll-Rand Co., 11 B'way, N. Y. C.

DRILLING MACHINES—Second Hand
Harris Bros. Co., Chicago, Ill.
Hill, Clarke & Co., Inc., Boston, Mass.

DRILLING MACHINES—Sensitive
Leland-Gifford Co., Worcester, Mass.
Taylor & Fenn Co., Hartford, Ct.
U. S. Drill Head Co., Cincinnati, Ohio.

DRILLING MACHINES—Upright
Barnes, W. F. & John Co., Rockford, Ill.

DRILLING MACHINES—Vertical
Baker Bros., Inc., Toledo, O.
Barnes Drill Co., Rockford, Ill.
Buffalo Forge Co., 492 B'way, Buffalo, N. Y.
Champion Blower & Forge Co., Lancaster, Pa.
Cincinnati Bickford Tool Co., Cincinnati, O.
McCabe, J. J., Lathe & Machry. Corp., 149 Broadway, New York City.
McCabe & Sheeran Machry. Corp., Room 482, 50 Church St., New York City.
Prentiss, Henry & Co., Inc., 149 Broadway, New York City.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

DRILLS—Ratchet
Armstrong Bros. Tool Co., Chicago, Ill.

DRIVES—Gear and Rope
Mesta Machine Co., Pittsburgh, Pa.

DROP FORGINGS—See Forgings

DROP HAMMERS—See Hammers—Drop

DROP PRESSES—See Presses—Drop

DRYERS FOR ALL MATERIAL
Duff Patents Co., Inc., Pittsburgh, Pa.

DUST COLLECTORS
American Fdry. Equip. Co., Mishawaka, Ind.
Knickerbocker Co., Jackson, Mich.
Pangborn Corporation, Hagerstown, Md.
Sly, W. W., Mfg. Company, Cleveland, O.
Sterling Blower Co., Hartford, Ct.

EJECTOR—Punch Press, Pneumatic
Logansport Mch. Co., The, Logansport, Ind.

ELECTRIC WELDING—See Welding—Electric

ELECTRICAL EQUIPMENT
General Electric Co., Schenectady, N. Y.

ELECTRICAL MACHINERY—Second Hand
Land, L. J., 207 Centre St., New York City.
Moore & MacDonald, 26 Cortlandt St., N. Y. C.
Niles, F. H., & Co., Inc., Woolworth Bldg., New York City.
Randle Machinery Co., Cincinnati, O.
Sachsenmaier, Geo., Co., Philadelphia, Pa.

ELECTRICAL WIRES
American Steel & Wire Co., Chicago, Ill.

ELEVATORS—Portable
Lewis-Shepard Co., Boston, Mass.

ELEVATORS—Steam Hydraulic
Ridgway, Craig & Son Co., Coatesville, Pa.

EMERY WHEELS—See Grinding Wheels

ENAMELING
Geuder, Paeschke & Frey Co. (Contract Mfg. Division), Milwaukee, Wis.

ENGINEERS—Consulting
Brassert, H. A., & Co., Chicago, Ill.
Chase, Frank D., Inc., Chicago, Ill.
Day & Zimmermann, Inc., Philadelphia, Pa.
Ellis, Frank L., Pittsburgh, Pa.
Lane, H. M., Co., Detroit, Mich.
McKee, Arthur G., & Co., Cleveland, O.
Moore, W. E., & Co., Pittsburgh, Pa.
Perin, C. P.—S. M. Marshall, 40 West 40th St., New York City.

ENGINEERS—Foundry
Austin Co., The, Cleveland, Ohio.
Chase, Frank D., Inc., Chicago, Ill.
Lane, H. M., Co., Detroit, Mich.

ENGINEERS—Metallurgical
Gathmann Engineering Co., Baltimore, Md.

ENGINEERS AND CONTRACTORS
Austin Co., The, Cleveland, Ohio.
Brosius, Edgar E., Pittsburgh, Pa.
Chase, Frank D., Inc., Chicago, Ill.
Day & Zimmermann, Inc., Philadelphia, Pa.
Ferguson, H. K., Company, Cleveland, O.
Kennedy, Julian, Pittsburgh, Pa.
Laughlin, Alex., & Co., Pittsburgh, Pa.
McKee, Arthur G., & Co., Cleveland, O.
McKee, Willis, Cleveland, O.
Moore, W. E., & Co., Pittsburgh, Pa.
Pennsylvania Engrg. Works, New Castle, Pa.
Smythe, S. R., Co., Pittsburgh, Pa.
Swindell, W. & Bros., Box 1753, Pittsburgh, Pa.

ENGINES—Blowing
Mackintosh-Hemphill Company, Pittsburgh, Pa.

ENGINES—Gas
Chicago Pneumatic Tool Co., 6 E. 44th St., New York City.
National Transit Pump & Mach. Co., Oil City, Pa.
Worthington Pump & Mchry. Corp., 115 B'way, New York City.

ENGINES—Oil
Chicago Pneumatic Tool Co., 6 E. 44th St., New York City.
Ingersoll-Rand Co., 11 Broadway, N. Y. C.
Worthington Pump & Mchry. Corp., 115 B'way, New York City.

ENGINES—Second Hand
Harris Bros. Co., Chicago, Ill.
Hooper-Momberger Co., 90 West St., N. Y. C.
Schultz, A. L., & Son, Chicago, Ill.
Stern, Bernhard & Sons, Milwaukee, Wis.

ENGINE—Steam
Troy Engine & Mch. Co., Troy, Pa.

EXHAUST HEADS
Sterling Blower Co., Hartford, Ct.

EXHAUSTERS—Gas
Connersville Blower Co., Connersville, Ind.
Spencer Turbine Co., Hartford, Ct.

EYELET MACHINES
Manville, E. J., Machine Co., Waterbury, Ct.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Ct.

EYELETS
Platt Bros. & Co., The, Waterbury, Ct.

FACING HEADS
Mummert-Dixon Co., Hanover, Pa.

FACTORY CONSTRUCTION
Austin Co., The, Cleveland, Ohio.

FACTORY AND PLANT SITES
Longview Co., The, Longview, Wash.

FEED WATER HEATERS AND PURIFIERS
Scaife, William B., & Sons Co., Pitts., Pa.

FELTS—Wool Mechanical
Booth Felt Co., Inc., The, 477-478 19th St., Brooklyn, N. Y.

FENCES—Woven Wire
American Steel & Wire Co., Chicago, Ill.
Gulf States Steel Co., Birmingham, Ala.

FENCING—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.

FERRO ALLOYS—Chromium
Lavino, E. J., & Co., Philadelphia, Pa.
Rogers Brown & Crocker Bros., Inc., 21 East 40th Street, New York City.
Samuel, Frank, & Co., Philadelphia, Pa.
U. S. Ferro Alloys Corp., 120 B'way, N. Y. C.
Vanadium Corp. of America, 120 B'way, N. Y. C.

FERRO ALLOYS—Manganese
Lavino, E. J., & Co., Philadelphia, Pa.
Leavitt, C. W., & Co., 30 Church St., N. Y. C.
Rogers Brown & Crocker Bros., Inc., 21 East 40th St., New York City.
Samuel, Frank, & Co., Philadelphia, Pa.

FERRO ALLOYS—Molybdenum
Lavino, E. J., & Co., Philadelphia, Pa.
Vanadium Corp. of America, 120 B'way, N. Y. C.

FERRO ALLOYS—Silico Manganese
Southern Ferro-Alloys Co., Chattanooga, Tenn.
U. S. Ferro Alloys Corp., 120 B'way, N. Y. C.
Vanadium Corp. of America, 120 B'way, N. Y. C.

FERRO ALLOYS—Silicon
Keokuk Electro-Metals Co., Keokuk, Iowa.
Lavino, E. J., & Co., Philadelphia, Pa.
Pittsburgh Metallurgical Co., Niagara Falls, N. Y.
Rogers Brown & Crocker Bros., Inc., 21 East 40th St., New York City.
Samuel, Frank, & Co., Philadelphia, Pa.
Southern Ferro Alloys Co., Chattanooga, Tenn.
Tutein, E. Arthur, Inc., Boston, Mass.
U. S. Ferro Alloys Corp., 120 B'way, N. Y. C.
Vanadium Corp. of America, 120 B'way, N. Y. C.

FERRO ALLOYS—Spiegeleisen
Rogers Brown & Crocker Bros., Inc., 21 East 40th St., New York City.

FERRO ALLOYS—Titanium
Metal & Thermit Corp., 120 B'way, N. Y. C.
Titanium Alloy Mfg. Co., Niagara Falls, N. Y.

FERRO ALLOYS—Tungsten
Lavino, E. J., & Co., Philadelphia, Pa.
Vanadium Corp. of America, 120 B'way, N. Y. C.

FERRO ALLOYS—Vanadium
Lavino, E. J., & Co., Philadelphia, Pa.
Vanadium Corp. of America, 120 B'way, N. Y. C.

FERRULES
Bay State Stpg. Co., Worcester, Mass.
Cleveland Punch & Shear Wks. Co., Cleve., O.

FIBRE AND FIBRE PRODUCTS—Hard
National Vulcanized Fibre Co., Wilmington, Del.

FILES AND RASPS
Disston, Henry, & Sons, Inc., Philadelphia, Pa.
Heller Bros. Co., Newark, N. J.

FILTER CLOTH—Metal
Ludlow-Saylor Wire Co., 606-610 Newstead Ave., St. Louis, Mo.

FILTERS—Pressure or Gravity
Scaife, Wm. B., & Sons Co., Pittsburgh, Pa.

FIRE CLAY
Ashland Fire Brick Company, Ashland, Ky.
Crescent Refractories Co., Curwensville, Pa.
Queens Run Refractories Co., Inc., Lock Haven, Pa.
U. S. Refractories Corp., Mount Union, Pa.

FITTINGS—Hydraulic
Watson-Stillman Co., 75 West St., N. Y. C.

FLANGES—Forged Steel
American Spiral Pipe Works, Chicago, Ill.
Cann & Saul Steel Co., Philadelphia, Pa.

FLANGES—Iron or Steel
Jefferson Union Co., Lexington, Mass.
Philadelphia Steel & Iron Co., Phila., Pa.

FLASKS—Foundry
American Fdry. Equip. Co., Mishawaka, Ind.
Diamond Clamp & Flask Co., Richmond, Ind.
Sterling Wheelbarrow Co., Milwaukee, Wis.
Truscon Steel Co., Youngstown, O.

FLOATS—Seamless Copper
Naugatuck Mfg. Co., Naugatuck, Ct.

FLOORING—Built-up Wood Blocks
Carter Bloxonend Flooring Co., Kansas City, Mo.

FLOORING—Creosoted Wood
Jennison-Wright Co., Toledo, O.

FLOORING—Metallic Ventilating
Hendrick Mfg. Co., Carbondale, Pa.
Irving Iron Works Co., Long Island City, N. Y.

FLOORING—Steel
Hendrick Mfg. Co., Carbondale, Pa.

FLUORSPAR
Lavino, E. J., & Co., Philadelphia, Pa.
Rogers Brown & Crocker Bros., Inc., 21 East 40th Street, New York City.

FLUX—Welding
Chromium Corp. of America, 26 Broadway, New York City.

FORGES—Rivet
Buffalo Forge Co., 492 B'way, Buffalo, N. Y.
Champion Blower & Forge Co., Lancaster, Pa.
Hauck Mfg. Co., 128 Tenth St., Brooklyn, N. Y.

FORGING MACHINES
Acme Machinery Co., Cleveland, O.
National Machinery Co., Tiffin, O.

FORGINGS—Alloy Steel
Bethlehem Steel Company, Bethlehem, Pa.
Cann & Saul Steel Co., Philadelphia, Pa.
Endicott Forging & Mfg. Co., Inc., Endicott, N. Y.
Kropp Forge Co., Chicago, Ill.
National Forge & Tool Co., Irvine, Pa.
Vulcan Steam Forging Co., Buffalo, N. Y.

FORGINGS—Brass, Bronze or Copper
Copper & Brass Research Assn., 25 B'way, New York City.
Michigan Smelting & Refining Co., Detroit, Mich.

FORGINGS—Drop, Iron or Steel
Akron-Selle Co., Akron, O.
Atlas Drop Forge Co., Lansing, Mich.
Bethlehem Steel Company, Bethlehem, Pa.
Cann & Saul Steel Co., Philadelphia, Pa.
Canton Forge & Axle Co., Canton, O.
Champion Machine & Forging Co., Cleve., O.
Chester Steel & Forge Co., Chester, Pa.
Clapp, E. D., Mfg. Co., The, Auburn, N. Y.
Cleveland Hardware Co., The, Cleveland, O.
Drop Forging Co. of New York, J. C., N. J.
Eccles, Richard, Co., Auburn, N. Y.
Endicott Forging & Mfg. Co., Inc., Endicott, N. Y.
Federal Drop Forge Co., Lansing, Mich.
General Drop Forge Co., Buffalo, N. Y.
Indianapolis Drop Forging Co., Indianapolis.
Kropp Forge Co., Chicago, Ill.
Lacicde Steel Co., St. Louis, Mo.
McWilliams, John, & Sons, Jersey City, N. J.
Machinery Forging Co., The, Cleveland, O.
Midwest Forge & Steel Co., East St. Louis, Ill.
Milwaukee Forge & Mch. Co., Milwaukee, Wis.
National Forge & Tool Co., Irvine, Pa.
Oliver Iron & Steel Corp., Pittsburgh, Pa.
Paul, W. P., Co., Philadelphia, Pa.
Philadelphia Steel & Iron Co., Phila., Pa.
Pittsburgh Knife & Forge Co., Coraopolis, Pa.
Queen City Forging Co., Cincinnati, O.
Rhode Island Tool Co., Providence, R. I.
Richmond Frgs. Corp. (Acca.), Richmond, Va.
Scranton Forging Co., Scranton, Pa.
Storms Drop Forging Co., East Springfield, Mass.
Strieby & Foote Co., Newark, N. J.
Tioga Steel & Iron Co., The, Philadelphia, Pa.
Transue & Williams Steel Forging Corp., Alliance, O.
Union Switch & Signal Co., Swissvale, Pa.
Wilcox, D., Mfg. Co., Mechanicsburg, Pa.
Williams, J. H., & Co., Buffalo, N. Y.

FORGINGS—Flat Die
Kropp Forge Co., Chicago, Ill.
Machinery Forging Co., The, Cleveland, O.

FORGINGS—Hammered
Columbia Mch. Works & Malleable Iron Co., 269 Chestnut St., Brooklyn, N. Y.
Jersey Forging Wks., Jersey City, N. J.
Steel, R., & Sons, Inc., 482-486 Vernon Ave., Long Island City, N. Y.
Vulcan Steam Forging Co., Buffalo, N. Y.

FORGINGS—Hydraulic Press. Iron or Steel
Atlas Drop Forge Co., Lansing, Mich.
Bethlehem Steel Company, Bethlehem, Pa.
Champion Mach. & Forging Co., Cleveland, O.
Heppenstall Forge & Knife Co., Pittsburgh, Pa.
Mesta Machine Co., Pittsburgh, Pa.
Tioga Steel & Iron Co., The, Philadelphia, Pa.
Wharton, William, Jr., & Co., Inc., Easton, Pa.

FORGINGS—Manganese Steel
Manganese Steel Forge Co., Philadelphia, Pa.

FORGINGS—Stainless Steel
Firth, Thos., & Sons, Inc., Hartford, Ct.

FORMING AND COILING MACHINES
Rafter Machine Co., Belleville, N. J.
Yoder Co., The, Cleveland, O.

FOUNDRY EQUIPMENT AND SUPPLIES
American Fdry. Equip. Co., Mishawaka, Ind.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York City.
Chromium Corp. of America, 26 Broadway, New York City.
Clifton-Pratt Co., Cincinnati, O.
Diamond Clamp & Flask Co., Richmond, Ind.
Grimes Molding Mch. Co., Detroit, Mich.
Ingersoll-Rand Co., 11 B'way, New York City.
National Engineering Company, Chicago, Ill.
Paxson, J. W., Co., Philadelphia, Pa.
Pettinos, Geo. F., Philadelphia, Pa.
Sly, W. W., Mfg. Company, Cleveland, O.
Truscon Steel Co., Youngstown, O.

FROGS AND SWITCHES—Railway
Bethlehem Steel Company, Bethlehem, Pa.

FURNACES—Billet or Ingot Heating
Hagan, Geo. J., Co., Pittsburgh, Pa.
International Furnace Co., Pittsburgh, Pa.
Swindell, W. & Bros., Box 1753, Pittsburgh, Pa.

FURNACES—Blast
McKee, Arthur G., & Co., Cleveland, O.
Pennsylvania Engrg. Works, New Castle, Pa.
Smythe, S. R., Co., Inc., The, Pittsburgh, Pa.

FURNACES—Crucible
International Furnace Co., Pittsburgh, Pa.
Swindell, W. & Bros., Box 1753, Pittsburgh, Pa.

FURNACES—Electric Steel Melting
American Bridge Co., 71 Broadway, N. Y. C.
Detroit Electric Furnace Co. Detroit, Mich.
General Electric Co., Schenectady, N. Y.
Pittsburgh Electric Furnace Corp., Pitts., Pa.
Swindell, W. & Bros., Box 1753, Pittsburgh, Pa.
Vom Baur Eng. Corp., 233 B'way, N. Y. C.

FURNACES—Enameling
International Furnace Co., Pittsburgh, Pa.

FURNACES—Forging
Anthony Co., The, Long Island City, N. Y.
Best, W. N., Corp., 11 B'way, New York City.
Chicago Flexible Shaft Co., Chicago, Ill.
International Furnace Co., Pittsburgh, Pa.
Rockwell, W. S., Co., 50 Church St., N. Y. C.
Strong, Carlisle & Hammond Co., The, Cleveland, O.
Swindell, W. & Bros., Box 1753, Pittsburgh, Pa.

FURNACES—Heat Treating, Automatic
International Furnace Co., Pittsburgh, Pa.
McCann-Harrison Corp., Cleveland, Ohio.
Rockwell, W. S., Co., 50 Church St., N. Y. C.

FURNACES—Heat Treating, Cyanide or Lead
American Gas Furnace Co., Elizabeth, N. J.
Chicago Flexible Shaft Co., Chicago, Ill.

FURNACES—Heat Treating, Electric
Electric Furnace Co., Salem, O.
General Electric Co., Schenectady, N. Y.
Hagan, Geo. J., Co., Pittsburgh, Pa.
Holcroft & Company, Detroit, Mich.
Hoskins Mfg. Co., Detroit, Mich.
Rockwell, W. S., Co., 50 Church St., N. Y. C.
Strong, Carlisle & Hammond Co., The, Cleveland, O.
Swindell, W. & Bros., Box 1753, Pittsburgh, Pa.
Vom Baur Eng. Corp., 233 B'way, N. Y. C.

FURNACES—Heat Treating, Oil, Gas or Coal Fired
American Gas Furnace Co., Elizabeth, N. J.
Anthony Company, The, Long Island City, N. Y.
Best, W. N., Corp., 11 Broadway, N. Y. C.
Chicago Flexible Shaft Co., Chicago, Ill.
Economy Furnace Co., Chicopee, Mass.
Hagan, Geo. J., Co., Pittsburgh, Pa.
Holcroft & Co., Detroit, Mich.
International Furnace Co., Pittsburgh, Pa.
McCann-Harrison Corp., Cleveland, Ohio.
Rockwell, W. S., Co., 50 Church St., N. Y. C.
Smythe, S. R., Co., Inc., The, Pittsburgh, Pa.
Strong, Carlisle & Hammond Co., The, Cleveland, O.
Surface Combustion Co., 366-368 Gerard Ave., Bronx, N. Y.
Swindell, W. & Bros., Box 1753, Pittsburgh, Pa.

FURNACES—High-Speed Steel
Chicago Flexible Shaft Co., Chicago, Ill.
International Furnace Co., Pittsburgh, Pa.
Swindell, W. & Bros., Box 1753, Pittsburgh, Pa.

FURNACES—Malleable Melting
Holcroft & Co., Detroit, Mich.
International Furnace Co., Pittsburgh, Pa.

FURNACES—Non-Ferrous Melting
Detroit Electric Furnace Co., Detroit, Mich.
Electric Furnace Co., Salem, O.
Strong, Carlisle & Hammond Co., The, Cleveland, O.

FURNACES—Open Hearth
Holcroft & Co., Detroit, Mich.
International Furnace Co., Pittsburgh, Pa.
Laughlin, Alex., & Co., Pittsburgh, Pa.
Swindell, W. & Bros., Box 1753, Pittsburgh, Pa.

FURNACES—Recuperating
International Furnace Co., Pittsburgh, Pa.

FURNACES—Rivet Heating
General Electric Co., Schenectady, N. Y.

FURNACES—Wire, Annealing & Galvanizing
General Electric Co., Schenectady, N. Y.
International Furnace Co., Pittsburgh, Pa.
Vaughn Mchry. Co., Cuyahoga Falls, Ohio.

FUSE METAL
Platt Bros. & Co., The, Waterbury, Ct.

GAGES—Pressure and Vacuum
Bristol Co., Waterbury, Ct.
Marshalltown Mfg. Co., Marshalltown, Iowa.

GAGES—Thread Lead
Jones & Lamson Machine Co., Springfield, Vt.

GALVANIZING
Bates Expanded Steel Truss Co., East Chicago, Ind.
Cattie Brothers Corp., Philadelphia, Pa.
Cattie, Joseph P., & Bros., Philadelphia, Pa.
Electro Sherardizing Co., The, Philadelphia, Pa.
International Derrick & Equipment Co., Columbus, O.

GALVANIZING PLANTS—For Sheets
Erie Foundry Company, Erie, Pa.
United Engrg. & Fdry. Co., Pittsburgh, Pa.

GALVANIZING & TINNING EQUIPMENT—Wire
Vaughn Mchry. Co., Cuyahoga Falls, Ohio.

GAS CLEANING PLANTS
Flinn & Dreffein Co., Chicago, Ill.
Smith Gas Engineering Co., Dayton, O.

GAS HOLDERS
Chicago Bridge & Iron Wks., Chicago, Ill.
Cruse-Kemper Co., Ambler, Pa.

GAS PRODUCERS
Duff Patents Co., Inc., Pittsburgh, Pa.
Flinn & Dreffein Co., Chicago, Ill.
Morgan Construction Co., Worcester, Mass.
Smythe, S. R., Co., Inc., The, Pittsburgh, Pa.
Swindell, W. & Bros., Box 1753, Pittsburgh, Pa.
U. S. Cast Iron Pipe & Fdry. Co., Burlington, N. J.
Wellman-Seaver-Morgan Co., Cleveland, O.
Wood, R. D., & Co., Philadelphia, Pa.

GAS—Welding
International Oxygen Co., Newark, N. J.

GASKETS—Felt
Booth Felt Co., Inc., The, 477-478 19th St., Brooklyn, N. Y.

GATES—Blast
Rockwell, W. S., Co., 50 Church St., N. Y. C.

GATES—Fence
American Steel & Wire Co., Chicago, Ill.

GEAR CUTTING
Adamson Machine Co., Akron, Ohio.
Akron Gear & Engng. Co., Akron, Ohio.
Albaugh-Dover Mfg. Co., Chicago, Ill.
Bethlehem Steel Company, Bethlehem, Pa.
Dundore Mfg. Co., Reading, Pa.
Earle Gear & Machine Co., Philadelphia, Pa.
Federal Gear, Inc., Cleveland, Ohio.
Gleason Works, Rochester, N. Y.
Grant Gear Works, Boston, Mass.
Hindley Gear Co., Philadelphia, Pa.
Jones, W. A., Foundry & Mach. Co., 4434 W. Roosevelt Road, Chicago, Ill.
Machine Products Co., The, Cleveland, Ohio.
Meisel Press Mfg. Company, Boston, Mass.
Morgan Construction Co., Worcester, Mass.
Pittsburgh Rolls Corp., Pittsburgh, Pa.
Sommerfeld Mch. & Mfg. Co., Pittsburgh, Pa.
Taylor Wilson Mfg. Co., McKees Rocks, Pa.
Van Dorn & Dutton Co., Cleveland, O.

GEAR CUTTING MACHINES
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Shaper Co., The, Cincinnati, Ohio.
Gleason Works, Rochester, New York.
Newark Gear Cutting Mch. Co., Newark, N. J.
Whiton, D. E., Mch. Co., New London, Conn.

GEAR DRIVES—Herringbone
Lewis Fdry. & Mach. Co., Pittsburgh, Pa.

GEAR HOBBING MACHINES
Gould & Eberhardt, Newark, N. J.
Newark Gear Cutting Mch. Co., Newark, N. J.

GEAR PLANING MACHINES
Gleason Works, Rochester, N. Y.

GEARS—Bevel
Earle Gear & Machine Co., Philadelphia, Pa.
Fawcus Machine Co., Pittsburgh, Pa.
Federal Gear, Inc., Cleveland, Ohio.
Foote Bros. Gear & Mch. Co., Chicago, Ill.
Gleason Works, Rochester, N. Y.
Grant Gear Works, Boston, Mass.
Horsburgh & Scott Co., Cleveland, O.
Jones, W. A., Foundry & Mach. Co., 4434 W. Roosevelt Road, Chicago, Ill.
Philadelphia Gear Works, Philadelphia, Pa.
Tool Steel Gear & Pinion Co., The, Cincinnati, O.
Van Dorn & Dutton Co., Cleveland, Ohio.

GEARS—Cast
Stroh Steel-Hardening Process Co., Pittsburgh, Pa.

GEARS—Double Helical Cut
De Laval Steam Turbine Co., Trenton, N. J.
Foote Bros. Gear & Mch. Co., Chicago, Ill.

GEARS—Enclosed Herringbone Transmission
Fawcus Machine Co., Pittsburgh, Pa.
Foote Bros. Gear & Mch. Co., Chicago, Ill.

GEARS—Heat Treated
Foote Bros. Gear & Mch. Co., Chicago, Ill.
Gleason Works, Rochester, N. Y.
Van Dorn & Dutton Co., Cleveland, O.

GEARS—Herringbone
Bethlehem Steel Co., Bethlehem, Pa.
Earle Gear & Machine Co., Philadelphia, Pa.
Falk Corp., Milwaukee, Wis.
Fawcus Machine Co., Pittsburgh, Pa.
Foote Bros. Gear & Mch. Co., Chicago, Ill.
Mesta Machine Co., Pittsburgh, Pa.
Niles-Bement-Pond Co., 111 B'way, N. Y. C.
Philadelphia Gear Works, Philadelphia, Pa.
Tool Steel Gear & Pinion Co., The, Cincinnati, Ohio.

GEARS—Machine Cut
Foote Bros. Gear & Mch. Co., Chicago, Ill.
Ganschow, Wm., Chicago, Ill.
Gleason Works, Rochester, N. Y.
Jones, W. A., Foundry & Mach. Co., 4434 W. Roosevelt Road, Chicago, Ill.
Mackintosh-Hemphill Co., Pittsburgh, Pa.
Meisel Press Mfg. Company, Boston, Mass.
Van Dorn & Dutton Co., Cleveland, O.

GEARS—Machine Molded
Jones, W. A., Foundry & Mach. Co., 4434 W. Roosevelt Road, Chicago, Ill.

GEARS—Non-Metallic
Akron Gear & Engng. Co., Akron, Ohio.
Boston Gear Works Sales Co., Norfolk Downs, Mass.
Chicago Rawhide Mfg. Co., 1313 Elston Ave., Chicago, Ill.
Federal Gear, Inc., Cleveland, Ohio.
Foote Bros. Gear & Mch. Co., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Grant Gear Works, Boston, Mass.
Meisel Press Mfg. Company, Boston, Mass.
Philadelphia Gear Works, Philadelphia, Pa.
Van Dorn & Dutton Co., Cleveland, O.

GEARS—Rawhide
Chicago Rawhide Mfg. Co., 1313 Elston Ave., Chicago, Ill.
Federal Gear, Inc., Cleveland, Ohio.
Foote Bros. Gear & Mch. Co., Chicago, Ill.
Horsburgh & Scott Co., Cleveland, O.
Jones, W. A., Foundry & Mach. Co., 4434 W. Roosevelt Road, Chicago, Ill.
Van Dorn & Dutton Co., Cleveland, O.

GEARS—Speed Reducing
Adamson Machine Co., Akron, Ohio.
Cleveland Worm & Gear Co., Cleveland, Ohio.
Foote Bros. Gear & Mch. Co., Chicago, Ill.
Ganschow, Wm., Chicago, Ill.
Hindley Gear Co., Philadelphia, Pa.
Horsburgh & Scott Co., Cleveland, O.
Jones, W. A., Foundry & Mach. Co., 4434 W. Roosevelt Road, Chicago, Ill.
Niles-Bement-Pond Co., 111 B'way, N. Y. C.

GEARS—Spiral
Foote Bros. Gear & Mch. Co., Chicago, Ill.
Van Dorn & Dutton Co., Cleveland, O.

GEARS—Spur
Adams Co., The, Dubuque, Iowa.
Boston Gear Works Sales Co., Norfolk Downs, Mass.
Earle Gear & Mach. Co., Philadelphia, Pa.
Fawcus Machine Co., Pittsburgh, Pa.
Federal Gear, Inc., Cleveland, Ohio.
Foote Bros. Gear & Mach. Co., Chicago, Ill.
Grant Gear Works, Boston, Mass.
Jones, W. A., Foundry & Mach. Co., 4434 W. Roosevelt Road, Chicago, Ill.
Niles-Bement-Pond Co., 111 B'way, N. Y. C.
Van Dorn & Dutton Co., Cleveland, O.

GEARS—Worm
Adams Co., The, Dubuque, Iowa.
Akron Gear & Engng. Co., Akron, Ohio.
Albaugh-Dover Mfg. Co., Chicago, Ill.
Cleveland Worm & Gear Co., Cleveland, O.
Fawcus Mach. Co., Pittsburgh, Pa.
Foote Bros. Gear & Mch. Co., Chicago, Ill.
Grant Gear Works, Boston, Mass.
Hindley Gear Co., Philadelphia, Pa.
Horsburgh & Scott Co., Cleveland, Ohio.
Jones, W. A., Foundry & Mach. Co., 4434 W. Roosevelt Road, Chicago, Ill.
Van Dorn & Dutton Co., Cleveland, O.

GEARS—Worm, Speed Reducers
Cleveland Worm & Gear Co., Cleveland, O.
De Laval Steam Turbine Co., Trenton, N. J.
Foote Bros. Gear & Mch. Co., Chicago, Ill.
Jones, W. A. Fdry. & Mch. Co., 4434 W. Roosevelt Rd., Chicago, Ill.

GENERATORS—Acetylene
Air Reduction Sales Co., 342 Madison Ave., New York City.
Imperial Brass Mfg. Co., Chicago, Ill.
Smith Welding Equipment Corp., Minneapolis, Minn.

GENERATORS—Electric
Archer & Baldwin, Inc., 126 Liberty St., New York City.

GENERATORS—Electric, Second Hand
Belyea Co., Inc., 147 W. 18th St., N. Y. C.
Harris Brothers Co., Chicago, Ill.
McCoy-Brandt Machinery Co., Pittsburgh, Pa.
Reading Engrg. Wks., Reading, Pa.
Stern, Bernhard & Sons, Milwaukee, Wis.

GLUE HEATERS
Dart, E. M., Mfg. Co., Providence, R. I.

GRAPHITE
Pettinos, Geo. F., Philadelphia, Pa.

GRATING—Flooring
Irving Iron Works Co., Long Island City, N. Y.

GRATING—Steel
Blaw-Knox Co., Pittsburgh, Pa.
Hendrick Mfg. Co., Carbondale, Pa.

GRATINGS—Area, Sidewalk, Etc.
Hendrick Mfg. Co., Carbondale, Pa.
Irving Iron Works Co., Long Island City, N. Y.

GREASE AND OIL CUPS
Bay State Stpg. Co., Worcester, Mass.

GRILLES
Hendrick Mfg. Co., Carbondale, Pa.

GRINDING AND POLISHING MACHINES
Bridgeport Safety Emery Wheel Co., Inc., Bridgeport, Ct.
Calder, Geo. H., Lancaster, Pa.
Dillon Electric Co., Canton, O.
Landis Tool Co., Waynesboro, Pa.
Ransom Mfg. Co., Oshkosh, Wis.
Springfield Mfg. Co., Bridgeport, Ct.
Sterling Grinding Wheel Co., Tiffin, O.
Stow Mfg. Co., Inc., Binghamton, N. Y.
U. S. Electrical Tool Co., Cincinnati, O.

GRINDING MACHINES—Belt
Porter-Cable Mch. Co., Syracuse, N. Y.

GRINDING MACHINES—Camshaft
Landis Tool Co., Waynesboro, Pa.

GRINDING MACHINES—Cutter and Reamer
Thompson Grinder Co., Springfield, O.
Wilmarth & Morman Co., Grand Rapids, Mich.

GRINDING MACHINES—Cylindrical
Brown & Sharpe Mfg. Co., Providence, R. I.
Heald Machine Co., Worcester, Mass.
Landis Tool Co., Waynesboro, Pa.

GRINDING MACHINES—Die
Bignall & Keeler Mch. Wks., Edwardsville, Ill.

GRINDING MACHINES—Disc
Gardner Mach. Co., Beloit, Wis.

GRINDING MACHINES—Drill
Landis Tool Co., Waynesboro, Pa.
Wilmarth & Morman Co., Grand Rapids, Mich.

GRINDING MACHINES—Internal
Greenfield Tap & Die Corp., Greenfield, Mass.
Heald Machine Co., Worcester, Mass.
Landis Tool Co., Waynesboro, Pa.
Prentiss, Henry, & Co., Inc., 149 B'way, New York City.
Rivett Lathe & Grinder Corp., Boston, Mass.

GRINDING MACHINES—Machine Knives
Bridgeport Safety Emery Wheel Co., Inc., Bridgeport, Ct.

GRINDING MACHINES—Portable Electric
Van Dorn Electric Tool Co., Cleveland, Ohio.

GRINDING MACHINES—Portable Pneumatic
Buckeye Portable Tool Co., The, Dayton, Ohio.

GRINDING MACHINES—Portable, Radial Swing
Mummert-Dixon Co., Hanover, Pa.

GRINDING MACHINES—Second Hand
Eddy, E. A., Mchry. Co., The, Providence, R. I.
Harris Bros. Co., Chicago, Ill.
Hill, Clarke & Co., Inc., Boston, Mass.
Morey & Co., Inc., 410 Broome St., N. Y. C.

GRINDING MACHINES—Snagging
Ransom Mfg. Co., Oshkosh, Wis.
Sterling Grinding Wheel Co., The, Tiffin, O.
U. S. Electrical Tool Co., Cincinnati, Ohio.

GRINDING MACHINES—Surface
Abrasive Machine Tool Company, East Providence, R. I.
Blanchard Mach. Co., Cambridge, Mass.
Bridgeport Safety Emery Wheel Co., Inc., Bridgeport, Ct.
Heald Machine Co., Worcester, Mass.
Wilmarth & Morman Co., Grand Rapids, Mich.

GRINDING MACHINES—Swing Frame
Pittsburgh Grinding Wheel Co., Rochester, Pa.
Sterling Grinding Wheel Co., Tiffin, O.

GRINDING MACHINES—Tool
Baird Mach. Co., Bridgeport, Ct.
Blake & Johnson Co., Waterbury, Ct.
Dillon Electric Co., Canton, O.
Landis Tool Co., Waynesboro, Pa.
Ransom Mfg. Co., Oshkosh, Wis.
Taylor & Fenn Co., Hartford, Ct.
Wilmarth & Morman Co., Grand Rapids, Mich.

GRINDING MACHINES—Universal
Landis Tool Co., Waynesboro, Pa.
Simmons Mach. Tool Corp., Albany, N. Y.
Thompson Grinder Co., Springfield, O.

GRINDING MACHINES—Vertical Surface
Blanchard Mach. Co., Cambridge, Mass.

GRINDING WHEEL DRESSERS AND CUTTERS
Calder, Geo. H., Lancaster, Pa.
Desmond-Stephan Mfg. Co., Urbana, O.
Dickinson, Thos. L., 34 Gold St., N. Y. C.
Westfield Grinding Wheel Co., Westfield, Mass.

GRINDING WHEEL STANDS—Bench and Floor
Cleveland Punch & Shear Wks. Co., Cleve., O.
Dillon Electric Co., Canton, O.

GRINDING WHEELS
New York Belting & Packing Co., 91-93 Chambers Street, New York City.
Pittsburgh Grinding Wheel Co., Rochester, Pa.
Springfield Mfg. Co., Bridgeport, Ct.
Sterling Grinding Wheel Co., Tiffin, O.
Westfield Grinding Wheel Co., Westfield, Mass.

GUARDS—Lamp
Hubbell, Harvey, Inc., Bridgeport, Conn.

HACK SAW BLADES—See Saws—Hack Saw Blades

HACK SAW MACHINES
Armstrong-Blum Mfg. Co., Chicago, Ill.
Diamond Saw & Stamping Wks., Buffalo, N. Y.
Peerless Machine Co., Racine, Wis.

HAMMERS—Air
Nazel Engrg. & Mch. Wks., Philadelphia, Pa.

HAMMERS—Belt and Motor Driven
Blacker Engineering Co., Inc., Grand Central Terminal, N. Y. C.
Bradley, C. C., & Son, Inc., Syracuse, N. Y.
Little Giant Company, Mankato, Minn.
Nazel Engrg. & Mch. Wks. Philadelphia, Pa.
Toledo Mach. & Tool Co., Toledo, O.
West Tire Setter Co., The, Rochester, N. Y.

HAMMERS—Blacksmiths' Forging
Blacker Engineering Co., Inc., Grand Central Terminal, N. Y. C.

HAMMERS—Board Drop
Chambersburg Engrg. Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.

HAMMERS—Drop
Chambersburg Engrg. Co., Chambersburg, Pa.
Erie Foundry Company, Erie, Pa.
Merrill Bros., Maspeth, N. Y.
Morgan Engineering Co., Alliance, O.
Niles-Bement-Pond Co., 111 B'way, N. Y. C.
Standard Machinery Co., Auburn, R. I.
Williams, White & Co., Moline, Ill.

HAMMERS—Pneumatic
Chicago Pneumatic Tool Co., 6 E. 44th St., New York City.
Cleveland Pneumatic Tool Co., The, Cleve., O.
Ingersoll-Rand Co., 11 B'way, New York City.

HAMMERS—Pneumatic Forging
Chambersburg Engrg. Co., Chambersburg, Pa.
Nazel Engng. & Mch. Wks., Philadelphia, Pa.
Sullivan Machinery Co., Chicago, Ill.

HAMMERS—Power
Blacker Engineering Co., Inc., Grand Central Terminal, N. Y. C.
Little Giant Company, Mankato, Minn.

HAMMERS—Rawhide
Chicago Rawhide Mfg. Co., 1313 Elston Ave., Chicago, Ill.

HAMMERS—Steam
Chambersburg Engrg. Co., Chambersburg, Pa.
Erie Foundry Company, Erie, Pa.
Morgan Engineering Co., Alliance, O.
Niles-Bement-Pond Co., 111 B'way, N. Y. C.
Steel, R., & Sons, Inc., 482-486 Vernon Ave., Long Island City, N. Y.

HANGERS—Factory Door
Myers, F. E., & Bro. Co., Ashland, O.

HANGERS—Shaft
Falls Clutch & Mchry. Co., Kent, O.
Hyatt Roller Bearing Co., Newark, N. J.
Hyman, Joseph, & Sons, Philadelphia, Pa.
Jones, W. A., Foundry & Mach. Co., 4434 W. Roosevelt Road, Chicago, Ill.

HARDNESS TESTING MACHINES
Shore Instrument & Mfg. Co., Inc., Jamaica, L. I., N. Y.
Wilson-Maeulen Co., Inc., 738 E. 143d St., New York City.

HARDWARE—Automobile
Eberhard Mfg. Co., Cleveland, Ohio.

HARDWARE—Wagon
Cleveland Hardware Co., Cleveland, Ohio.
Eberhard Mfg. Co., Cleveland, Ohio.

HEAT TREATING
Bellis Heat Treating Co., Branford, Conn.
General Mach. Works, York, Pa.
Machine Prod. Co., The, Cleveland, O.

HEATING AND VENTILATING APPARATUS
Buffalo Forge Co., 492 B'way, Buffalo, N. Y.

HINGES—Invisible
Soss Mfg. Co., Grand Ave. & Bergen St., Brooklyn, N. Y.

HINGES—Wrought Brass Butt
Root Co., Bristol, Conn.

HOBS—Formed and Ground
National Twist Drill & Tool Co., Detroit, Mich.

HOISTING MACHINES
Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.

HOISTS—Air
Chicago Pneumatic Tool Co., 6 E. 44th St., New York City.
Detroit Hoist & Mach. Co., Detroit, Mich.
Hanna Eng. Works, Chicago, Ill.
Ingersoll-Rand Co., 11 B'way, New York City.
Northern Engineering Works, 212 Chene St., Detroit, Mich.

HOISTS—Chain
Chisholm-Moore Mfg. Co., Cleveland, Ohio.
Ford Chain Block Co., Philadelphia, Pa.
Reading Chain & Block Corp., Reading, Pa.
Wright Mfg. Co., Lisbon, O.

HOISTS—Electric
American Engineering Co., Aramingo & Cumberland Sts., Philadelphia, Pa.
Box Crane & Hoist Corp., Phila., Pa.
Chisholm-Moore Mfg. Co., Cleveland, Ohio.
Cleveland Electric Tramrail, Wickliffe, Ohio.
Detroit Hoist & Mach. Co., Detroit, Mich.
Drake Electric Hoist Co., Inc., Friendship, N. Y.
Euclid Crane & Hoist Co., Euclid, O.
Harnischfeger Corp., Milwaukee, Wis.
Link-Belt Co., Chicago, Ill.
McCollum Hoist & Mfg. Co., Downers Grove, Ill.
Mallory Machry. Corp., Baltimore, Md.
Maris Brothers, Inc., Philadelphia, Pa.
Milwaukee Electric Crane & Mfg. Corp., Milwaukee, Wis.
Payne, N. B., & Co., 25 Church St., N. Y. C.
Reading Chain & Block Corp., Reading, Pa.
Roeper Crane & Hoist Works, Inc., Reading, Pa.
Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.

HOISTS—(Electric) Second Hand
Goodman Elec. Mchry. Co., Newark, N. J.

HOISTS—Electric Traveling
American Engineering Co., Aramingo & Cumberland Sts., Philadelphia, Pa.
Box Crane & Hoist Corp., Phila., Pa.
Drake Electric Hoist Co., Inc. Friendship, N. Y.
Euclid Crane & Hoist Co., Euclid, Ohio.
Harnischfeger Corp., Milwaukee, Wis.
Northern Engineering Works, 212 Chene St., Detroit, Mich.
Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.

HOISTS—Mono-rail
American Engineering Co., Aramingo & Cumberland Sts., Philadelphia, Pa.
Cleveland Electric Tramrail, Wickliffe, Ohio.
Euclid Crane & Hoist Co., Euclid, O.
Harnischfeger Corp., Milwaukee, Wis.
Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.

HOISTS—Second Hand
Harris Bros. Co., Chicago, Ill.

HOLDERS—Nipple
Curtis & Curtis Co., Bridgeport, Ct.

HOOPS—Wire
American Steel & Wire Co., Chicago, Ill.

HOOPS AND BANDS
American Tube & Stpg. Plant, The (The Stanley Works), Bridgeport, Ct.
De Haven Mfg. Co., 50-54 Columbia Heights, Brooklyn, N. Y.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Sharon Steel Hoop Co., Sharon, Pa.
Stanley Works, New Britain, Conn.

HOSE—Air, Oil, Steam and Water
American Metal Hose Co., Waterbury, Ct.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York City.
New York Belting & Packing Co., 91-93 Chambers St., New York City.
Pennsylvania Flexible Metallic Tubing Co., Philadelphia, Pa.

HOSE—Flexible Metallic
American Metal Hose Co., Waterbury, Ct.
Pennsylvania Flexible Metallic Tubing Co., Philadelphia, Pa.

HOSE—Rubber
New York Belting & Packing Co., 91-93 Chambers Street, New York City.

HYDRANTS—Fire
Wood, R. D., & Co., Philadelphia, Pa.

HYDRAULIC MACHINERY
Adamson Machine Co., Akron, Ohio.
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Fdry. & Mch. Co., Birdsboro, Pa.
Chambersburg Engrg. Co., Chambersburg, Pa.
Elmes, Chas. J. Engrg. Wks., Chicago, Ill.
French Oil Mill Mchry. Co., Piqua, Ohio.
Morgan Engineering Co., Alliance, O.
Watson-Stillman Co., 75 West St., N. Y. C.
Wood, R. D., & Co., Philadelphia, Pa.

HYDROGEN
International Oxygen Co., Newark, N. J.

HYPODERMIC NEEDLE TUBING
Summerill Tubing Co., Bridgeport, Montgomery County, Pa.

INGOT MOLDS
Bethlehem Steel Co., Bethlehem, Pa.
Gathmann Engineering Co., Baltimore, Md.
Penn Mold & Mfg. Co., The, Wheeling, W. Va.
Valley Mould & Iron Corp., Sharpsville, Pa.

INGOTS—Aluminum
Erdle Perforating Co., Rochester, N. Y.
Leavitt, C. W., & Co., 30 Church St., N. Y. C.

INGOTS—Brass, Bronze or Copper
Michigan Smelting & Refining Co., Detroit, Mich.

INGOTS—Copper and Bronze
Copper & Brass Research Assn., 25 B'way, New York City.

INSTRUMENTS—Recording
Bristol Co., Waterbury, Ct.

INSULATION—Boiler, Furnace, etc.
Celite Products Co., 11 Broadway, N. Y. C.

INSULATION—Fibre
National Vulcanized Fibre Co., Wilmington, Del.

INSULATION—High Temperature
Celite Products Co., 11 B'way, N. Y. C.

INSULATION—Laminated Bakelite
National Vulcanized Fibre Co., Wilmington, Del.

IRON BARS
Lockhart Iron & Steel Co., Pittsburgh, Pa.

IRON—Chain
Bethlehem Steel Co., Bethlehem, Pa.

IRON—Forging Blooms
Lockhart Iron & Steel Co., Pittsburgh, Pa.

IRON—Rustless
Ludlum Steel Co., Watervliet, N. Y.

IRON—Stainless
Allegheny Steel Co., Brackenridge, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
United Alloy Steel Corp., Canton, Ohio.

IRON—Staybolt
Bethlehem Steel Co., Bethlehem, Pa.
Lockhart Iron & Steel Co., Pittsburgh, Pa.
Ryerson, Jos. T., & Sons, Inc., Chicago, Ill.

IRON OR STEEL—Swedish
Ljusne-Woxna Co., Ltd., Ljusne, Sweden
Kloster Steel Corp., Chicago, Ill.
Swedish Iron & Steel Corp., 66 Rutledge St., Brooklyn, N. Y.

IRONWORK—Sheet Steel and Angle
Kirk & Blum Mfg. Co., 2851 Spring Grove Ave., Cincinnati, O.

JIGS, FIXTURES, TOOLS, ETC.—See Tools, Jigs, Fixtures, Etc.

KEYSEATING MACHINES
Baker Bros., Inc., Toledo, O.
Davis Keyseater Company, Rochester, N. Y.
Morton Mfg. Co., Muskegon, Mich.

KEYS—Machine
Morton Mfg. Co., Muskegon, Mich.

KEYS—Riveted
Hindley Mfg. Co., Valley Falls, R. I.

KNIVES—Machine
Simonds Saw & Steel Co., Fitchburg, Mass.
Stroh Steel-Hardening Process Co., Pittsburgh, Pa.
Wapakoneta Machine Co., Wapakoneta, O.

LACING—Belt, Rawhide
Chicago Rawhide Mfg. Co., 1313 Elston Ave., Chicago, Ill.

LATH—Metal
Truscon Steel Co., Youngstown, Ohio.

LATHE ACCESSORIES AND ATTACHMENTS
Nielsen, Inc., Lawton, Mich.
Steinle Turret Machine Co., Madison, Wis.

LATHE CENTERS
Nielsen, Inc., Lawton, Mich.

LATHE SPINDLES—Solid and Hollow Bored
National Forge & Tool Co., Irvine, Pa.

LATHES—Automatic
Bullard Machine Tool Co., Bridgeport, Ct.
Jones & Lamson Machine Co., Springfield, Vt.

LATHES—Bench
Rivett Lathe & Grinder Corp., Boston, Mass.

LATHES—Chucking
International Machine Tool Co., Ind., Ind.
Jones & Lamson Mach. Co., Springfield, Vt.

LATHES—Engine
American Tool Works Co., Cincinnati, O.
Consolidated Mch. Tool Corp. of America, Rochester, N. Y.
Greaves-Klusman Tool Co., Cincinnati, O.
Hill, Clarke & Co. of Chicago, 647 W. Washington Blvd., Chicago, Ill.
Hill, Clarke & Co., Inc., Boston, Mass.
Lodge & Shipley Mch. Tool Co., Cincinnati, O.
McCabe, J. J., Lathe & Mchry. Corp., 149 Broadway, New York City.
McCabe & Sheeran Machinery Corp., Room 482, 50 Church St., New York City.
Monarch Machine Tool Co., The, Sidney, O.
Niles-Bement-Pond Co., 111 B'way, N. Y. C.
Osborne & Sexton Machry. Co., Columbus, O.
Rahn-Larmon Co., The, Cincinnati, O.
Reed-Prentice Corp., Worcester, Mass.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Wickes Brothers, Saginaw, Mich.

LATHES—Extension Gap
Rahn-Larmon Co., The, Cincinnati, O.

LATHES—Foot Power
Barnes, W. F., & John Co., Rockford, Ill.

LATHES—Roll
Lewis Foundry & Mach. Co., Pittsburgh, Pa.
Standard Engineering Co., Ellwood City, Pa.
United Engrg. & Fdy. Co., Pittsburgh, Pa.

LATHES—Screw-Cutting
Gisholt Machine Co., Madison, Wis.
Rivett Lathe & Grinder Corp., Boston, Mass.

LATHES—Second-Hand
Botwinik Bros., Inc., New Haven, Conn.
Eddy, E. A., Mchry. Co., The, Providence, R. I.
Harris Bros. Co., Chicago, Ill.
Hill, Clarke & Co., Inc., Boston, Mass.
Lamberg, A., & Co., 241 Centre St., N. Y. C.
McCabe, J. J., Lathe & Machy. Corp. 149 Broadway, New York City.
McCabe & Sheeran Machry. Corp., Room 482, 50 Church St., New York City.
Morey & Co., Inc., 410 Broome St., N. Y. C.
Russell Machine Co., Pittsburgh, Pa.
Simmons Mach. Tool Corp., Albany, N. Y.

LATHES—Spinning
Adriance Mach. Works, Inc., 82 Richards St., Brooklyn, N. Y.

LATHES—Turret
Acme Machine Tool Co., Cincinnati, O.
Bullard Machine Tool Co., Bridgeport, Ct.
Gisholt Machine Co., Madison, Wis.
International Machine Tool Co., Indianapolis, Ind.
Jones & Lamson Mach. Co., Springfield, Vt.
Steinle Turret Mach. Co., Madison, Wis.

LATHES—Wheel and Axle
Niles-Bement-Pond Co., 111 B'way, N. Y. C.

LEATHER—Cup
Chicago Rawhide Mfg. Co., 1313 Elston Ave., Chicago, Ill.

LEATHER—Hydraulic
Chicago Rawhide Mfg. Co., 1313 Elston Ave., Chicago, Ill.

LINING—Converter
Edge Hill Silica Rock Co., New Brunswick, N. J.

LINING—Cupola
Edge Hill Silica Rock Co., New Brunswick, N. J.
Plibrico Jointless Firebrick Co., Chicago, Ill.

LINKS—Chain
Laughlin, Thomas, Co., The, Portland, Me.

LOCOMOTIVES—Electric
Atlas Car & Mfg. Co., Cleveland, O.
General Electric Co., Schenectady, N. Y.

LOCOMOTIVES—Gasoline
Fate-Root-Heath Co., Plymouth, O.
Vulcan Iron Works, Wilkes-Barre, Pa.

LOCOMOTIVES—Industrial
Fate-Root-Heath Co., Plymouth, O.

LOCOMOTIVES—Steam
Vulcan Iron Works, Wilkes-Barre, Pa.

LOCOMOTIVES—Storage Battery
Atlas Car & Mfg. Co., Cleveland, O.

LUMBER—Creosoted or Zinc Treated
Century Wood Preserving Co., Pittsburgh, Pa.
Jennison-Wright Co., Toledo, O.

LUMBER—Flask
Dock & Mill Co., 120 Main St., N. Tonawanda, N. Y.

LUMBER—Pattern
Dock & Mill Co., 120 Main St., N. Tonawanda, N. Y.

LUMBER—Template
Dock & Mill Co., 120 Main St., N. Tonawanda, N. Y.

MACHINE WORK
Adamson Mach. Co., The, Akron, O.
Boucher, H. E., Mfg. Co., 150 Lafayette St., New York City.
Columbia Mch. Works & Malleable Iron Co., 269 Chestnut St., Brooklyn, N. Y.
Cowdrey, C. H., Machine Works, 30 Summer St., Fitchburg, Mass.
Dietz Machine Works, Philadelphia, Pa.
Frederick Iron & Steel Co., Frederick, Md.
Frisbie Motor Company, The, Middletown, Ct.
General Mach. Works, York, Pa.
Hanna Engineering Works, Chicago, Ill.
Hartford Special Machinery Co., The, Hartford, Ct.
Hershey Mch. & Fdry. Co., Manheim, Pa.
Jenkins Machine Co., Sheboygan Falls, Wis.
Johnson, Carlyle, Mach. Co., Manchester, Ct.
Lambert & Todd Mach. Co., Camden, N. J.
Lane Manufacturing Co., Montpelier, Vt.
McCabe, J. J., Lathe & Mchry. Corp., 10th & Brunswick Sts., Jersey City, N. J.
McGill Machine Co., Binghamton, N. Y.
Matthews, H. A., Mfg. Co., Seymour, Ct.
Morehouse Machine Co., York, Pa.
Osborn Mach. Co., Du Bois, Pa.
Porter Machine Co., Inc., Jersey City, N. J.
Sherwood Mfg. Co., Buffalo, N. Y.
Sweet & Doyle Foundry & Mach. Co., Troy, (Green Island), N. Y.
Thompson Brothers, Philadelphia, Pa.
Universal Machine Co., Baltimore, Md.
Wright Mfg. Co., Inc., Cincinnati, Ohio.

MACHINERY DEALERS
Adams, Ogden R., Co., Inc., Rochester, N. Y.
Bennett Mchry. Co., 30 Church St., N. Y. C.
Cincinnati Mchry. & Supply Co., Cincinnati, O.
Clifton-Pratt Co., Cincinnati, Ohio.
Crane-Schiefer-Owens, Inc., Buffalo, N. Y.
Delta Equipment Co., Philadelphia, Pa.
Donahue Steel Prod. Co., Chicago, Ill.
Eastern Machinery Co., Cincinnati, Ohio.
Eddy, E. A., Mchry. Co., The, Providence, R. I.
Essley, E. L., Machinery Co., Chicago, Ill.
Failor, N. C., Co., Inc., 30 Church St., New York City.
Fitzsimmons & Cole Machry. Co., Pittsburgh, Pa.
Harris Bros. Co., Chicago, Ill.
Hill, Clarke & Co., Inc., Boston, Mass.
Hill, Clarke & Co. of Chicago, 647 W. Washington Blvd., Chicago, Ill.
Hitner's, Henry A., Sons Co., Philadelphia, Pa.
Industrial Mchry. Corp., Jersey City, N. J.
Jansson Machinery Exchange, 231 Centre St., New York City.
Jones Machine Tool Co., Cincinnati, O.
Lamberg, A., & Co., 241 Centre St., N. Y. C.
Larkin, M. D., Co., Dayton, Ohio.
Lucas, J. L., & Son, Inc., Bridgeport, Conn.
Lynd-Farquhar Co., Boston, Mass.
McCabe, J. J., Lathe & Mchry. Corp., 149 Broadway, New York City.
McCabe & Sheeran Mchry. Corp., Room 482, 50 Church St., New York City.
MacCabe, T. B., Philadelphia, Pa.
Miles Machinery Co., Saginaw, W. S. Mich.
Morey & Co., Inc., 410 Broome St., N. Y. C.
Niles-Bement-Pond Co., 111 B'way, N. Y. C.
Niles, F. H., & Co., Inc., Woolworth Bldg., New York City.
O'Brien Mchry. Co., Philadelphia, Pa.
Prentiss, Henry, & Co., Inc., 149 B'way, N.Y.C.
Prussian, M., Mchry. Co., Detroit, Mich.
Randle Machinery Co., Cincinnati, O.
Reliance Machinery Sales Co., Pittsburgh, Pa.
Richey-Whaley Mchry. Co., Indianapolis, Ind.
Riverside Mchry. Depot, Detroit, Mich.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Samler Bros., Baltimore, Md.
Severin-Tripp Mchry. Co., 25 Church St., New York City.
Schoonmaker, A. G., & Sons, Inc., 30 Church St., New York City.
Simmons Mach. Tool Corp., Albany, N. Y.
Stocker-Rumely-Wachs Co., Chicago, Ill.
Strong, Homer & Co., Inc., 285 State St., Rochester, N. Y.
Sun Mchry. Co., Inc., Newark, N. J.
Wayne Machine Co., Indianapolis, Ind.
White, A. D., Machinery Co., Chicago, Ill.
Wickes Machry. Co., Jersey City, N. J.

MACHINISTS—Contracting
Konigslow, Otto, Mfg. Co., Cleveland, O.

MACHINISTS' TOOLS AND SUPPLIES—See Tools

MAGNESITE—Brick or Dead Burnt
General Refractories Co., Philadelphia, Pa.
Harbison-Walker Refractories Co., Pittsburgh, Pa.
Lavino, E. J., & Co., Philadelphia, Pa.

MAGNETS—Lifting
Electric Controller & Mfg. Co., Cleveland, O.
Ohio Electric & Controller Co., Cleveland, O.

MAGNETS—(Lifting) Second Hand
Goodman Elec. Mchry. Co., Newark, N. J.

MALLETS—Rawhide
Chicago Rawhide Mfg. Co., 1313 Elston Ave., Chicago, Ill.

MANDRELS—Expanding
Nicholson, W. H., & Co., 115 Oregon St., Wilkes-Barre, Pa.

MANUFACTURING SITES
Longview Co., The, Longview, Wash.

METAL SPECIALTIES
American Spring & Mfg. Corp., Holley, Mich.
Bossert Corp., The, Utica, N. Y.
Bridgeport Metal Goods Mfg. Co., Bridgeport, Conn.
Columbia Mch. Works & Malleable Iron Co., 269 Chestnut St., Brooklyn, N. Y.
Cuyahoga Spring Co., Cleveland, O.
Fischer, Chas., Spring Co., 240 Kent Ave., Brooklyn, N. Y.
Geuder, Paeschke & Frey Co. (Contract Mfg. Division), Milwaukee, Wis.
Globe Mach. & Stpg. Co., Cleveland, O.
Jahn, B., Mfg. Co., The, New Britain, Conn.
Matthews Mfg. Co., Worcester, Mass.
Metal Specialty Co., Cincinnati, Ohio.
Otto, William H., Metal Goods Corp., Jersey City, N. J.
Rome Mfg. Company, Rome, N. Y.
Thorn, J. S., Co., Philadelphia, Pa.
Truscon Steel Co., Youngstown, Ohio.
Worcester Stamped Metal Co., Worcester, Mass.

METERS—Water and Oil
Worthington Pump & Mchry. Corp., 115 B'way, New York City.

MICA SCHIST
Edge Hill Silica Rock Co., New Brunswick, N. J.

MILLING MACHINE ACCESSORIES AND ATTACHMENTS
Kearney & Trecker Corp., Milwaukee, Wis.

MILLING MACHINES—Horizontal
Brown & Sharpe Mfg. Co., Providence, R. I.
Consolidated Mch. Tool Corp. of America, Rochester, N. Y.
Kearney & Trecker Corp., Milwaukee, Wis.
McCabe, J. J., Lathe & Mchry. Corp., 149 Broadway, New York City.
McCabe & Sheeran Machinery Corp., Room 482, 50 Church St., New York City.
Niles-Bement-Pond Co., 111 B'way, N. Y. C.

MILLING MACHINES—Manufacturing
McCabe, J. J., Lathe & Machinery Corp., 149 Broadway, New York City.
McCabe & Sheeran Machry. Corp., Room 482, 50 Church St., New York City.

MILLING MACHINES—Plain
McCabe, J. J., Lathe & Machinery Corp., 149 Broadway, New York City.
McCabe & Sheeran Machry. Corp., Room 482, 50 Church St., New York City.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

MILLING MACHINES—Second Hand
Botwinik Bros., Inc., New Haven, Conn.
Harris Bros. Co., Chicago, Ill.
Hill, Clarke & Co., Inc., Boston, Mass.
Lamberg, A., & Co., 241 Centre St., N. Y. C.
McCabe, J. J., Lathe & Machry. Corp., 149 Broadway, New York City.
McCabe & Sheeran Machry. Corp., Room 482, 50 Church St., New York City.
Russell Machine Co., Pittsburgh, Pa.
Simmons Mach. Tool Corp., Albany, N. Y.

MILLING MACHINES—Universal
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

MILLING MACHINES—Vertical
Niles-Bement-Pond Co., 111 B'way, N. Y. C.

MIXING MACHINES—Sand
Bartlett, C. O., & Snow Co., Cleveland, O.
National Engineering Co., Chicago, Ill.

MOLDING MACHINES—Combination
American Fdry. Equip. Co., Mishawaka, Ind.

MOLDING MACHINES—Jarring (Air)
Arcade Mfg. Co., Freeport, Ill.
Nicholls, Wm. H., Co., Inc., 4 College Place, Brooklyn, N. Y.

MOLDING MACHINES — Rollover (Hand and Power Operated)
Arcade Mfg. Co., Freeport, Ill.
Grimes Molding Mch. Co., Detroit, Mich.

MOLDING MACHINES—Stripping Plate
Nicholls, Wm. H., Co., Inc., 4 College Place, Brooklyn, N. Y.

MONEL METAL
International Nickel Co., 67 Wall St., N. Y. C.
Williams & Co., Inc., 911 Pennsylvania Ave., N. S., Pittsburgh, Pa.

MOTORS—Electric
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Baldor Electric Company, St. Louis, Mo.
Ohio Electric & Controller Co., Cleveland, O.

MOTORS—Electric, Second Hand
Archer & Baldwin, Inc., 126 Liberty St., New York City.
Belyea Company, Inc., 147 W. 18th St., N.Y.C.
Botwinik Bros., Inc., New Haven, Conn.
Delta Equipment Co., Philadelphia, Pa.
Harris Bros. Co., Chicago, Ill.
Ingram-Richardson Mfg. Co., Beaver Falls, Pa.
Land, L. J., 207 Centre St., New York City.
McCoy-Brandt Machry. Co., Pittsburgh, Pa.
Mitchell, Guy K., Baltimore, Md.
O'Brien Machry. Co., Philadelphia, Pa.
Sachsenmaier, Geo., Co., Philadelphia, Pa.

MOULDINGS—Cold Rolled
Kawneer Co., Niles, Mich.

NAILS—Cement Coated
American Steel Co., Ellwood City, Pa.
American Steel & Wire Co., Chicago, Ill.

NAILS—Copper Wire
Conklin, T. E., Brass & Copper Co., Inc., 54 Lafayette St., New York City.

NAILS—Cut Copper
Conklin, T. E., Brass & Copper Co., Inc., 54 Lafayette St., New York City.

NAILS—Galvanized
American Steel Co., Ellwood City, Pa.
American Steel & Wire Co., Chicago, Ill.

NAILS—Wire
American Steel & Wire Co., Chicago, Ill.
Bethlehem Steel Co., Bethlehem, Pa.
Gulf States Steel Co., Birmingham, Ala.
Pittsburgh Steel Co., Pittsburgh, Pa.
Townsend Co., New Brighton, Pa.
Wickwire Bros., Cortland, N. Y.

NICKEL
American Nickel Corp., Pittsburgh, Pa.
International Nickel Co., 67 Wall St., N. Y. C.
U. S. Nickel Co., New Brunswick, N. J.
Williams & Co., Inc., 911 Pennsylvania Ave., N. S., Pittsburgh, Pa.

NICKEL ANODES—Rolled and Cast
Seymour Mfg. Co., Seymour, Ct.

NITROGEN
Air Reduction Sales Co., 342 Madison Ave., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City.

NUTS—Brass, Bronze and Copper
Everitt Co., The, Boston, Mass.

NUTS—Castellated
Foster Bolt & Nut Co., The, Cleveland, Ohio.
National Acme Co., Cleveland, Ohio.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Western Screw Products Co., St. Louis, Mo.

NUTS—Cold Punched
Foster Bolt & Nut Co., The, Cleveland, Ohio.
Pawtucket Mfg. Co., Pawtucket, R. I.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Hot Punched
Foster Bolt & Nut Co., The, Cleveland, Ohio.

NUTS—Lock
Palnut Co., The, Irvington, N. J.

NUTS—Semi-Finished
Foster Bolt & Nut Co., The, Cleveland, Ohio.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Thumb Malleable
Philadelphia Hardware & Malleable Iron Wks., Inc., Philadelphia, Pa.

ORES—Chrome, Lump and Ground
General Refractories Co., Philadelphia, Pa.
Lavino, E. J., & Co., Philadelphia, Pa.
Rogers Brown & Crocker Bros., Inc., 21 East 40th Street, New York City.
U. S. Nickel Co., New Brunswick, N. J.

ORES—Iron
Cleveland-Cliffs Iron Co., Cleveland, Ohio.
Park & Williams, Inc., Philadelphia, Pa.
Pilling & Co., Inc., Philadelphia, Pa.
Rogers Brown & Crocker Bros., Inc., 21 East 40th Street, New York City.
Snyder, W. P., & Co., Pittsburgh, Pa.
Tutein, E. Arthur, Inc., Boston, Mass.

ORES—Manganese
Lavino, E. J., & Co., Philadelphia, Pa.
Rogers Brown & Crocker Bros., Inc., 21 East 40th Street, New York City.

OVENS—Baking
Gehnrich Indirect Heat Oven Co., Inc., Long Island City, N. Y.
McCann-Harrison Corp., Cleveland, Ohio.
Oven Equipment & Mfg. Co., New Haven, Ct.
Steiner, E. E., & Co., Newark, N. J.
Young Bros., Co., Detroit, Mich.

OVENS—Core
Gehnrich Indirect Heat Oven Co., Inc., Long Island City, N. Y.
Holcroft & Company, Detroit, Mich.
McCann-Harrison Corp., Cleveland, Ohio.
Machler, Paul, Co., The, Chicago, Ill.
Sly, W. W., Mfg. Co., Cleveland, Ohio.
Swartwout Co., The, Cleveland, Ohio.
Young Bros., Co., Detroit, Mich.

OVENS—Drying
Detroit Sheet Metal Wks., Detroit, Mich.
Gehnrich Indirect Heat Oven Co., Inc., Long Island City, N. Y.
Holcroft & Co., Detroit, Mich.
McCann-Harrison Corp., Cleveland, Ohio.
Machler, Paul, Co., The, Chicago, Ill.
Swartwout Co., The, Cleveland, Ohio.
Young Bros., Co., Detroit, Mich.

OVENS—Enameling and Japanning
Gehnrich Indirect Heat Oven Co., Inc., Long Island City, N. Y.
McCann-Harrison Corp., Cleveland, Ohio.
Machler, Paul, Co., The, Chicago, Ill.
Oven Equipment & Mfg. Co., New Haven, Ct.
Steiner, E. E., & Co., Newark, N. J.
Swartwout Co., The, Cleveland, Ohio.
Young Bros., Co., Detroit, Mich.

OVENS—Lacquering
Young Bros., Co., Detroit, Mich.

OXYGEN
Air Reduction Sales Co., 342 Madison Ave., New York City.
International Oxygen Co., Newark, N. J.
Linde Air Products Co., The, 30 E. 42nd St., New York City.

PACKING—Leather
Chicago Rawhide Mfg. Co., 1313 Elston Ave., Chicago, Ill.
Watson-Stillman Co., 75 West St., N. Y. C.

PACKING—Rubber
Jenkins Bros., 80 White Street, N. Y. C.
New York Belting & Packing Co., 91-93 Chambers Street, New York City.

PANS—Grinding
National Engineering Co., Chicago, Ill.

PATENT ATTORNEYS
Boyle, John, Jr., Washington, D. C.

PATTERN SHOP EQUIPMENT AND SUPPLIES
American Saw Mill Mchry. Co., 181 Main St., Hackettstown, N. J.

PATTERNS—Wood and Metal
Allison Pattern Works, Dayton, Ohio.
Cleveland Castings Pattern Co., The, Cleveland, O.
Columbia Mch. Works & Malleable Iron Co., 269 Chestnut St., Brooklyn, N. Y.
McDermott Pattern Wks., Inc., 231-233 W. Grand Ave., Chicago, Ill.
Marion Malleable Iron Works, Marion, Ind.
Modern Machine & Pattern Co., Terre Haute, Ind.
Sweet & Doyle Fdry. & Mch. Co., Troy, (Green Island), N. Y.

PERFORATED METAL
Chicago Perforating Co., Chicago, Ill.
Cross Engineering Co., Carbondale, Pa.
Erdle Perforating Co., Rochester, N. Y.
Harrington & King Perforating Co., Chicago.
Hendrick Manufacturing Co., Carbondale, Pa.
Mundt, Chas., & Sons, Jersey City, N. J.
Remly Mfg. Company, Tamaqua, Pa.

PHOSPHORIZERS
McCullough-Dalzell Crucible Co., Pitts., Pa.

PICKLING COMPOUNDS
American Chemical Paint Co., Ambler, Pa.

PIG IRON
Bethlehem Steel Company, Bethlehem, Pa.
Cleveland-Cliffs Iron Co., Cleveland, Ohio.
Lavino, E. J., & Co., Philadelphia, Pa.
Ljusne-Woxna Co., Ltd., Ljusne, Sweden
Park & Williams, Inc., Philadelphia, Pa.
Pilling & Co., Inc., Philadelphia, Pa.
Rogers Brown & Crocker Bros., Inc., 21 East 40th St., New York City.
St. Louis Coke & Iron Corp., Chicago, Ill.
Snyder, W. P., & Co., Pittsburgh, Pa.
Southern Ferro Alloys Co., Chattanooga, Tenn.
Stewart Furnace Company, The, Cleveland, O.
Tenn. Coal, Iron & R.R. Co., Birmingham, Ala.
Tutein, E. Arthur, Inc., Boston, Mass.
Waldo, Egbert & Maltby, Inc., Buffalo, N. Y.
Walter-Wallingford & Co., Cincinnati, O.
Wickwire Spencer Steel Co., 41 E. 42nd St., N. Y. C.

PILING—Steel Sheet
Bethlehem Steel Company, Bethlehem, Pa.
Wemlinger, Inc., 149 Broadway, N. Y. C.

PINIONS—Rolling Mill
Mesta Machine Co., Pittsburgh, Pa.

PIPE—Brass or Copper
American Brass Company, Waterbury, Ct.
Copper & Brass Research Assn., 25 B'way, New York City.
Williams & Co., Inc., 911 Pennsylvania Ave., N. S., Pittsburgh, Pa.

PIPE—Cast Iron, B. & S. and Flanged
U. S. Cast Iron Pipe & Fdry. Co., Burlington, N. J.
Wood, R. D., & Co., Philadelphia, Pa.

PIPE—Genuine Wrought Iron
Keating, E. F., Co., 452 Water St., N. Y. C.

PIPE—Hammer Welded
National Tube Co., Pittsburgh, Pa.

PIPE—New and Second-Hand
Albert & Davidson Pipe Corp., 256-264 Oakland St., Brooklyn, N. Y.
Albert Pipe Supply Co., Inc., Berry and N. 13th St., Brooklyn, N. Y.
Columbia Steel & Tube Corp., Woolworth Bldg., New York City.
Greenpoint Iron & Pipe Corp., Inc., 187-197 Maspeth Ave., Brooklyn, N. Y.

L. & D. Pipe Supply Co., Inc., 1096 Flushing Ave., Brooklyn, N. Y.
McDowell & Co., Pittsburgh, Pa.
Schreer & Foster, Inc., 211-217 Kent Ave., Brooklyn, N. Y.
Ullman, Jacob, Buffalo, N. Y.

PIPE—Riveted Steel
Abendroth & Root Mfg. Co., Newburgh, N. Y.
Petroleum Iron Works Co., Sharon, Pa.
Struthers-Wells Co., Warren, Pa.

PIPE—Spiral Riveted
Abendroth & Root Mfg. Co., Newburgh, N. Y.
American Spiral Pipe Works, Chicago, Ill.

PIPE—Standard
Central Tube Co., Pittsburgh, Pa.
Keating, E. F., Co., 452 Water St., N. Y. C.
National Tube Co., Pittsburgh, Pa.
Republic Iron & Steel Co., Youngstown, O.
Wheeling Steel Corp., Wheeling, W. Va.

PIPE—Wrought Iron
Crane Co., Chicago, Ill.
Keating, E. F., Co., 452 Water St., N. Y. C.

PIPE CUTTING AND THREADING MACHINES
Bignall & Keeler Mch. Wks., Edwardsville, Ill.
Chicago Pipethread Machine Co., 1621 Racine St., Racine, Wis.
Curtis & Curtis Co., Bridgeport, Ct.
Jarecki Mfg. Co., Erie, Pa.
Landis Mach. Co., Inc., Waynesboro, Pa.
Merrell Mfg. Co., Toledo, O.
Murchey Mach. & Tool Co., Detroit, Mich.
Pipe Machry. Co., The, Cleveland, O.
Saunders, D., Sons, Yonkers, N. Y.
Standard Engineering Co., Ellwood City, Pa.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.
Treadwell Engineering Co., Easton, Pa.
Williams Tool Corporation, Erie, Pa.

PIPE FITTINGS
Crane Co., Chicago, Ill.
Jarecki Mfg. Co., Erie, Pa.
Malleable Iron Fittings Co., Branford, Ct.
Pittsburgh Valve Fdry. & Con. Co., Pittsburgh, Pa.

PLANING MACHINES—Metal
American Tool Works Co., Cincinnati, O.
Cincinnati Planer Co., The, Cincinnati, O.
Cleveland Planer Co., The, Cleveland, O.
Consolidated Mch. Tool Corp. of America, Rochester, N. Y.
Gray, G. A., Co., Cincinnati, O.
Liberty Mch. Tool Co., Hamilton, O.
Morton Mfg. Co., Muskegon, Mich.
Niles-Bement-Pond Co., 111 B'way, N. Y. C.
Ohio Machine Tool Co., Kenton, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

PLANING MACHINES—Open Side
Cincinnati Planer Co., The, Cincinnati, O.
Cleveland Planer Co., The, Cleveland, O.
Gray, G. A., Co., Cincinnati, O.
Liberty Mch. Tool Co., Hamilton, O.

PLANING MACHINES—Second Hand
Hill, Clarke & Co., Inc., Boston, Mass.

PLANTS FOR SALE
Chesapeake Iron Wks., Baltimore, Md.
Crankshaft Mch. Co., Jackson, Mich.
Gaillard Realty Co., 100 E 42nd St., New York City.

PLATERS' CLEANING COMPOUND
Oakite Products, Inc., 22 Thames St., N. Y. C.

PLATES—Alloy Steel
Eddystone Steel Co., Crum Lynne, Pa.

PLATES—Cellar Door and Floor
American Pressed Steel Co., Philadelphia, Pa.
Central Iron & Steel Co., Harrisburg, Pa.
Wood, Alan, Iron & Steel Co., Phila., Pa.

PLATES—Felloe
Wrought Washer Mfg. Co., Milwaukee, Wis.

PLATES—Iron and Steel
American Pressed Steel Co., Philadelphia, Pa.
Bethlehem Steel Company, Bethlehem, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
Central Iron & Steel Co., Harrisburg, Pa.
Illinois Steel Co., Chicago, Ill.
Inland Steel Company, Chicago, Ill.
Republic Iron & Steel Co., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.
United Alloy Steel Corp., Canton, O.
Wood, Alan, Iron & Steel Co., Phila., Pa.

PLATES—Manganese Steel
Manganese Steel Forge Co., Philadelphia, Pa.

PLATING—Chrome Alloy
Chromium Corp. of America, 26 Broadway, New York City.

PLUGS—Core Hole
Hubbard, M. D., Spring Co., Pontiac, Mich.

PLUMBING FIXTURES—Brass
Enterprise Brass Works, Muskegon Heights, Mich.

PNEUMATIC TOOLS
Buckeye Portable Tool Co., The, Dayton, Ohio.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York City.
Cleveland Pneumatic Tool Co., The, Cleveland, O.
Ingersoll-Rand Co., 11 Broadway, N. Y. C.

POINTING AND THREADING MACHINERY
Economy Engineering Co., The, Willoughby, O.

POSTS—Steel Fence
American Steel & Wire Co., Chicago, Ill.

POTS—Lead, Cyanide or Carbonizing
Monroe Steel Castings Co., Monroe, Mich.

POWDERED COAL EQUIPMENT — See Pulverized Coal Equipment

POWER TRANSMITTING MACHINERY
American Pulley Co., Philadelphia, Pa.
Caldwell, H. W., & Son Co., Chicago, Ill.
Falk Corp., Milwaukee, Wis.
Falls Clutch & Mchry. Co., Kent, Ohio.
Jones, W. A., Foundry & Mach. Co., 4434 W. Roosevelt Road, Chicago, Ill.
Schultz, A. L., & Son, Chicago, Ill.

PRESS ATTACHMENTS
Littell, F. J., Mach. Co., Chicago, Ill.

PRESSED STEEL PARTS
Bossert Corp., The, Utica, N. Y.
Geuder, Paeschke & Frey Co. (Contract Mfg. Div.), Milwaukee, Wis.
Metal Specialty Co., Cincinnati, Ohio.
Truscon Steel Co., Youngstown, O.

PRESSES—Arbor
Logansport Mch. Co., The, Logansport, Ind.
Nicholson, W. H., & Co., 115 Oregon St., Wilkes-Barre, Pa.

PRESSES—Bending or Straightening
Chambersburg Engrg. Co., Chambersburg, Pa.
General Mfg. Co., Detroit, Mich.
Watson-Stillman Co., 75 West St., N. Y. C.

PRESSES—Die
Hydraulic Press Mfg. Co., The, Columbus, O.
Watson-Stillman Co., 75 West St., N. Y. C.

PRESSES—Drop
Bliss, E. W., Co., 53d St. & 2d Ave., Brooklyn, N. Y.
Standard Machinery Co., Auburn, R. I.

PRESSES—Extrusion
Watson-Stillman Co., 75 West St., N. Y. C.

PRESSES—Foot
Adriance Mach. Works, Inc., 82 Richards St., Brooklyn, N. Y.
Baird Machine Co., Bridgeport, Conn.
Shuster, F. B., Co., New Haven, Ct.
Taylor & Fenn Co., Hartford, Ct.

PRESSES—Forcing
General Mfg. Co., Detroit, Mich.
Hydraulic Press Mfg. Co., The, Columbus, O.
Lucas Mch. Tool Co., Cleveland, Ohio.
Watson-Stillman Co., 75 West St., N. Y. C.

PRESSES—Forging
Morgan Engineering Co., Alliance, O.
Toledo Machine & Tool Co., Toledo, O.
United Engineering & Foundry Co., Pitts., Pa.
Watson-Stillman Co., 75 West St., N. Y. C.

PRESSES—Hot and Cold Plate
Watson-Stillman Co., 75 West St., N. Y. C.

PRESSES—Hydraulic
Adamson Machine Co., Akron, Ohio.
Birdsboro Steel Fdry. & Mch. Co., Birdsboro, Pa.
Chambersburg Engrg. Co., Chambersburg, Pa.
Elmes, Chas. F., Engrg. Works, Chicago, Ill.
French Oil Mill Machry. Co., Piqua, O.
Hydraulic Press Mfg. Co., The, Columbus, O.
Lake Erie Engineering Corp., Buffalo, N. Y.
Mesta Machine Co., Pittsburgh, Pa.
Morgan Engineering Co., Alliance, O.
Oilgear Co., The, 659 Park St., Milwaukee, Wis.
Southwark Fdry. & Mach. Co., Phila., Pa.
Watson-Stillman Co., 75 West St., N. Y. C.
Wood, R. D., & Company, Philadelphia, Pa.

PRESSES — Hydraulic, Straightening and Assembling
American Broach & Mch. Co., Ann Arbor, Mich.
Hydraulic Press Mfg. Co., The, Columbus, O.

PRESSES—Power
Adriance Machine Works, Inc., 82 Richards St., Brooklyn, N. Y.
Baird Machine Co., Bridgeport, Ct.
Bliss, E. W., Co., 53d St. & 2d Ave., Brooklyn, N. Y.
Cincinnati Shaper Co., The, Cincinnati, O.
Etna Machine Co., The, Toledo, O.
General Mfg. Co., Detroit, Mich.
Hyman, Joseph, & Sons, Philadelphia, Pa.
Leffler, Chas., & Co., 61 Clymer St., Brooklyn, N. Y.
Loy & Nawrath Division Birmingham Iron Foundry, Derby, Conn.
Manville, E. J., Mach. Co., Waterbury, Ct.
Niagara Machine & Tool Works, Buffalo, N. Y.
Ohl, George A., & Co., Inc., Newark, N. J.
Peck, Stow & Wilcox Co., Southington, Ct.
Robinson, J. M., Mfg. Co., Cinn., Ohio.
Standard Machinery Co., Auburn, R. I.
Thomas Spacing Machine Co., Pittsburgh, Pa.
Toledo Mach. & Tool Co., Toledo, O.
V. & O. Press Co., Hudson, N. Y.
Waterbury Farrel Fdry. & Machine Co., Waterbury, Ct.
Zeh & Hahnemann Co., Newark, N. J.

PRESSES—Roofing and Corrugating
Streine Tool & Mfg. Co., The, New Bremen, O.

PRESSES—Scrap Bundling
Hydraulic Press Mfg. Co., The, Columbus, O.
Standard Machinery Co., Auburn, R. I.

PRESSES—Sub
Blake & Johnson Co., Waterbury, Ct.
U. S. Tool Co., Inc., The, Ampere, N. J.

PRESSES—Trimming
Chambersburg Engrg. Co., Chambersburg, Pa.
Peck, Stow & Wilcox Co., Southington, Ct.

PRESSES—Wheel
Bethlehem Steel Co., Bethlehem, Pa.
Chambersburg Engrg. Co., Chambersburg, Pa.
French Oil Mill Machry Co., Piqua, Ohio.
Hydraulic Press Mfg. Co., The, Columbus, O.
Niles-Bement-Pond Co., 111 B'way, N. Y. C.

PULLEYS—Friction Clutch
Caldwell, W. E., Co., 260 Brandeis Street, Louisville, Ky.
Conway Clutch Co., 1948 W. 5th St., Cincinnati, O.
Jones, W. A., Foundry & Mach. Co., 4434 W Roosevelt Road, Chicago, Ill.

PULLEYS—Iron, Solid and Split
Caldwell, W. E., Co., 260 Brandeis Street, Louisville, Ky.
Falls Clutch & Mchry. Co., Kent, Ohio.
Jones, W. A., Foundry & Mach. Co., 4434 W. Roosevelt Road, Chicago, Ill.
Medart Company, The, St. Louis, Mo.

PULLEYS—Magnetic
Dings Magnetic Separator Co., Milwaukee, Wis.

PULLEYS—Steel, Rim Solid and Split
American Pulley Co., Philadelphia, Pa.
Hyman, Joseph, & Sons, Philadelphia, Pa.

PULVERIZED COAL EQUIPMENT
Combustion Engineering Corp., 43 Broad St., New York City.

PULVERIZERS
Bethlehem Steel Co., Bethlehem, Pa.

PULVERIZERS—Coal
American Pulverizer Co., St. Louis, Mo.
Bethlehem Steel Co., Bethlehem, Pa.

PUMPS—Boiler Feed
Dean Bros. Co., Indianapolis, Ind.
Deming Co., The, Salem, Ohio.
Ingersoll-Rand Co., (Cameron) 11 B'way, New York City.
Lecourteuny Co., Newark, N. J.
Manistee Iron Works Co., Manistee, Mich.
Morris Machine Works, Baldwinsville, N. Y.
Pennsylvania Pump & Compressor Co., Easton, Pa.

PUMPS—Centrifugal
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., 492 B'way, Buffalo, N. Y.
De Laval Steam Turbine Co., Trenton, N. J.
Frederick Iron & Steel Co., Frederick, Md.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Ingersoll-Rand Co. (Cameron), 11 Broadway, New York City.
Lecourtenay Co., Newark, N. J.
Manistee Iron Works Co., Manistee, Mich.
Morris Mach. Works, Baldwinsville, N. Y.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Worthington Pump & Mchry. Corp., 115 B'way, New York City.

PUMPS—Electric
Deming Co., The, Salem, Ohio.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Myers, F. E., & Bro. Co., Ashland, O.
Worthington Pump & Mchry. Corp., 115 B'way, New York City.

PUMPS—Hand and Power
Deming Co., The, Salem, Ohio.
Myers, F. E., & Bro. Co., Ashland, O.

PUMPS—Hydraulic
Dean Bros. Co., Indianapolis, Ind.
Elmes, Chas. F., Engrg. Works, Chicago, Ill.
Hydraulic Press Mfg. Co., The, Columbus, O.
Southwark Fdry. & Mch. Co., Philadelphia, Pa.
Watson-Stillman Co., 75 West St., N. Y. C.
Wood, R. D., & Company, Philadelphia, Pa.

PUMPS—Pneumatic Air Lift
Ingersoll-Rand Co., 11 B'way, N. Y. C.
Sullivan Machinery Co., Chicago, Ill.

PUMPS—Power
Worthington Pump & Mchry. Corp., 115 B'way, New York City.

PUMPS—Rotary
Connersville Blower Co., Connersville, Ind.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Roots, P. H. & F. M., Co., Connersville, Ind.

PUMPS—Steam
American Steam Pump Co., Battle Creek, Mich.
Ingersoll-Rand Co. (Cameron), 11 Broadway, New York City.
National Transit Pump & Mch. Co., Oil City, Pa.
Ullman, Jacob, Buffalo, N. Y.
Worthington Pump & Mchry. Corp., 115 B'way, New York City.

PUMPS—Vacuum
Bury Compressor Co., Erie, Pa.
Ingersoll-Rand Co., 11 B'way, New York City.
Sullivan Machinery Co., Chicago, Ill.
Worthington Pump & Mchry. Corp., 115 B'way, New York City.

PUNCHES—Pneumatic
Hanna Engineering Wks., Chicago, Ill.

PUNCHES AND DIES
Cleveland Punch & Shear Wks. Co., Cleve., O.
Cleveland Steel Tool Co., Cleveland, Ohio.
Marchant, Geo. F., Co., Chicago, Ill.

PUNCHING AND SHEARING MACHINES
Armstrong-Blum Mfg. Co., Chicago, Ill.
Beatty Machine & Mfg. Co., Hammond, Ind.
Bertsch & Co., Cambridge City, Ind.
Buffalo Forge Co., 492 B'way, Buffalo, N. Y.
Chambersburg Engrg. Co., Chambersburg, Pa.
Cleveland Punch & Shear Wks. Co., Cleve., O.
Consolidated Mch. Tool Corp. of America., Rochester, N. Y.
Hendley & Whittemore Co., Beloit, Wis.
Lake Erie Engineering Corp., Buffalo, N. Y.
Niagara Machine & Tool Works, Buffalo, N. Y.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Southwark Fdry. & Mch. Co., Phila., Pa.
Thomas Spacing Machine Co., Pittsburgh, Pa.
Whitney Metal Tool Co., Rockford, Ill.
Wickes Brothers, Saginaw, Mich.
Williams, White & Co., Moline, Ill.

PURIFIERS—Oil
De Laval Steam Turbine Co., Trenton, N. J.

PYROMETERS
Bristol Co., Waterbury, Ct.
Hoskins Mfg. Co., Detroit, Mich.
Wilson-Maeulen Co., Inc., 738 E. 143d St., New York City.

RAIL BONDS
American Steel & Wire Co., Chicago, Ill.

RAIL SPLICE BARS
Ames, W., & Co., Jersey City, N. J.

RAILS
Briddell, W. C., Co., Inc., Baltimore, Md.
Cohen, Louis, & Son, Wilkes-Barre, Pa.
Continental Iron & Steel Co., 33 Rector St., New York City.
Foster, L. B., Co., Inc., Pittsburgh, Pa.
Frank, M. K., Pittsburgh, Pa.
Green, L. A., Railway Equipment Co., Pittsburgh, Pa.
Illinois Steel Co., Chicago, Ill.
Lindheimer, S. W., Chicago, Ill.
Luria Bros. & Co., Inc., Woolworth Bldg., New York City.
Morrison & Risman Co., Inc., The, Buffalo, N. Y.
Richardson & Co., Inc., Pittsburgh, Pa.
Robinson & Orr, Pittsburgh, Pa.
Sherwood, E. C., 50 Church St., New York, N. Y.
Tenn. Coal, Iron & R.R. Co., Birmingham, Ala.
Waldo, Egbert & McClain, Buffalo, N. Y.

RAILS—Relaying
Foster, L. B., Co., Inc., Pittsburgh, Pa.

RAILWAY EQUIPMENT AND SUPPLIES
Briddell, W. C., Co., Inc., Baltimore, Md.
Columbia Mch. Works & Malleable Iron Co., 269 Chestnut St., Brooklyn, N. Y.
Continental Iron & Steel Co., 33 Rector St., N. Y. C.
Fort Pitt Malleable Iron Co., Pittsburgh, Pa.
Foster, L. B., Co., Inc., Pittsburgh, Pa.
Morrison & Risman Co., Inc., The, Buffalo, N. Y.
Pidgeon-Thomas Iron Co., Memphis, Tenn.
Waldo, Egbert & McClain, Buffalo, N. Y.

REAMERS—Adjustable and Expansion
Brown-McLaren Mfg. Co., Detroit, Mich.
Brubaker, W. L., & Bros. Co., 50 Church St., New York City.
Buckeye Twist Drill Co., The, Alliance, O.
Cleveland Twist Drill Co., Cleveland, O.
McCrosky Tool Corp., Meadville, Pa.
Millersburg Reamer & Tool Co., Millersburg, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Union Twist Drill Co., Athol, Mass.

REFLECTORS—Lamp
Hubbell, Harvey, Inc., Bridgeport, Ct.

REGULATORS—Pressure
Crane Co., Chicago, Ill.

REINFORCING METAL FOR CONCRETE WORK
Truscon Steel Co., Youngstown, O.

RETAINING WALLS—Precast
R. C. Products Co., Cleveland, Ohio.

RIDDLES—Foundry
Ludlow-Saylor Wire Co., 600-610 Newstead Ave., St. Louis, Mo.

RINGS—Forged
Akron-Selle Co., Akron, Ohio
Jersey Forging Wks., Jersey City, N. J.

RINGS—Iron or Steel
Milwaukee Forge & Mch. Co., Milwaukee, Wis.
Vulcan Steam Forging Co., Buffalo, N. Y.

RIVET CUTTING GUNS
Rivet Cutting Gun Co., Cincinnati, O.

RIVET MAKING MACHINERY
Acme Machinery Co., Cleveland, O.
Manville, E. J., Mach. Co., Waterbury, Ct.
National Machry. Co., Tiffin, O.

RIVET SETS AND STANDS
Chicago Pneumatic Tool Co., 6 East 44th St., New York City.
Cleveland Punch & Shear Wks. Co., Cleve., O.
Cleveland Steel Tool Co., Cleveland, Ohio.
Hunter Saw & Machine Co., 5660 Butler St., Pittsburgh, Pa.
Marchant, Geo. F., Co., Chicago, Ill.

RIVETING MACHINES
Allen, John F., Co., 372 Gerard Ave., N. Y. C.
Chambersburg Engrg. Co., Chambersburg, Pa.
Hanna Engrg. Works, Chicago, Ill.
Shuster, F. B., Co., New Haven, Ct.
Watson-Stillman Co., The, 75 West St., New York City.
Wood, R. D., & Company, Philadelphia, Pa.

RIVETS
American Screw Co., Providence, R. I.
Bethlehem Steel Company, Bethlehem, Pa.
Clark Bros. Bolt Co., Milldale, Ct.
Hubbell, Harvey, Inc., Bridgeport, Ct.
National Bolt & Nut Company, Pittsburgh, Pa.
Oliver Iron & Steel Corp., Pittsburgh, Pa.
Progressive Mfg. Co., Torrington, Ct.
Rockford Bolt Co., Rockford, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Townsend Co., New Brighton, Pa.

RIVETS AND BURRS—Copper
Conklin, T. E., Brass & Copper Co., Inc., 54 Lafayette St., New York City.

ROD MILL MACHINERY
Vaughn Machry. Co., Cuyahoga Falls, O.

RODS—Brass, Bronze, Copper or Nickel Silver
American Brass Co., Waterbury, Conn.
Conklin, T. E., Brass & Copper Co., Inc., 54 Lafayette St., New York City.
Scovill Mfg. Co., Waterbury, Ct.
Seymour Mfg. Co., Seymour, Ct.

RODS—Drill
Pittsburgh Tool Steel Wire Co., Monaca, Pa.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

RODS—Nickel
Seymour Mfg. Co., Seymour, Ct.

RODS—Phosphor Bronze
American Brass Co., Waterbury, Ct.
Seymour Mfg. Co., Seymour, Ct.

RODS—Welding
Air Reduction Sales Co., 342 Madison Ave., New York City.
American Brass Co., Waterbury, Ct.
Wilson Welder & Metals Co., Inc., Wilson Bldg., Hoboken Factory Terminal, Hoboken, N. J.

RODS—Welding, Manganese Steel
Manganese Steel Forge Co., Philadelphia, Pa.

RODS—Wire
American Steel & Wire Co., Chicago, Ill.
Fitzsimons Co., Youngstown, Ohio.
Pittsburgh Steel Co., Pittsburgh, Pa.
Washburn Wire Co., 118th St. & Harlem River, N. Y. C.
Wheeling Steel Corp., Wheeling, W. Va.
Wickwire Bros., Cortland, N. Y.
Wickwire Spencer Steel Co., 41 E. 42nd St., N. Y. C.

ROLLING MACHINERY—Cold Rolling
Bliss, E. W., Co., 53d St., & 2d Ave., Brooklyn, N. Y.
Kane & Roach, Syracuse, N. Y.
Lewis Foundry & Mach. Co., Pittsburgh, Pa.
Streine Tool & Mfg. Co., The, New Bremen, O.
Yoder Co., The, Cleveland, O.

ROLLING MACHINERY—Corrugating
Streine Tool & Mfg. Co., The, New Bremen, O.

ROLLING MACHINES—Sheet Metal
Lewis Foundry & Mach. Co., Pittsburgh, Pa.
Streine Tool & Mfg. Co., The, New Bremen, O.

ROLLING MILL MACHINERY
Adamson Machine Co., Akron, Ohio.
Birdsboro Steel Fdry. & Mch. Co., Birdsboro, Pa.
Blake & Johnson Co., Waterbury, Ct.
Bliss, E. W., Co., 53d St., & 2d Ave., Brooklyn, N. Y.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Foundry & Mach. Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., Pittsburgh, Pa.
Mesta Machine Co., Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
Morgan Engineering Co., Alliance, O.
Philadelphia Roll & Mach. Co., Phila., Pa.
Standard Engineering Co., Ellwood City, Pa.
Standard Machinery Co., Auburn, R. I.
Treadwell Engineering Co., Easton, Pa.
United Engrg. & Fdry. Co., Pittsburgh, Pa.
Waterbury-Farrel Fdry. & Machine Co., Waterbury, Ct.
Wheeling Mold & Fdry. Co., Wheeling, W. Va.

ROLLS—Alloy Steel
Pittsburgh Rolls Corp., Pittsburgh, Pa.
United Engrg. & Fdry. Co., Pittsburgh, Pa.

ROLLS—Bending and Straightening
Bertsch & Co., Cambridge City, Ind.
Bethlehem Steel Company, Bethlehem, Pa.
Cleveland Punch & Shear Wks. Co., Cleve., O.
Hendley & Whittemore Co., Beloit, Wis.
Lake Erie Engineering Corp., Buffalo, N. Y.
McCabe, J. J., Lathe & Machry. Corp., 140 Broadway, New York City.
McCabe & Sheeran Mchry. Corp., Room 482, 50 Church St., New York City.
Marshalltown Mfg. Co., Marshalltown, Ia.
Niagara Machine & Tool Works, Buffalo, N. Y.
Niles-Bement-Pond Co., 111 B'way, N. Y. C.
Ryerson, Jos. T., & Sons, Inc., Chicago, Ill.
Southwark Foundry & Machine Co., Phila., Pa.
Wickes Brothers, Saginaw, Mich.

ROLLS—Sand Chilled and Steel
Adamson Machine Co., Akron, Ohio.
American Steel Foundries, Chicago, Ill.
Birdsboro Steel Fdry. & Mch. Co., Birdsboro, Pa.
Hyde Park Fdry. & Mch. Co., Hyde Park, Pa.
Lewis Foundry & Mach. Co., Pittsburgh, Pa.
Mesta Machine Co., Pittsburgh, Pa.
Philadelphia Roll & Mach. Co., Phila., Pa.
Pittsburgh Rolls Corp., Pittsburgh, Pa.
Standard Engineering Co., Ellwood City, Pa.
United Engrg. & Fdry. Co., Pittsburgh, Pa.
Wheeling Mold & Fdry. Co., Wheeling, W. Va.

ROLLS—Special Hardened
Bethlehem Steel Company, Bethlehem, Pa.

ROOFING—Cement Tile
American Cement Tile Mfg. Co., Pittsburgh, Pa.
Federal Cement Tile Co., Chicago, Ill.

ROOFING—Concrete
Austin Co., The, Cleveland, Ohio.

ROOFING AND SIDING—Corrugated and Plain
American Sheet & Tin Plate Co., Pitts., Pa.
Apollo Steel Co., Apollo, Pa.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
United Alloy Steel Corp., Canton, Ohio.

ROOFING AND SIDING—Iron and Steel
Apollo Steel Co., Apollo, Pa.
Newport Rolling Mill Co., Newport, Ky.
United Alloy Steel Corp., Canton, Ohio.

RUST PREVENTATIVES
American Chemical Paint Co., Ambler, Pa.
Oakite Products, Inc., 22 Thames St., N. Y. C.

RUST REMOVING
American Chemical Paint Co., Ambler, Pa.
Nukem Products Corp., 93 Rapin St., Buffalo, N. Y.

SAFETY DEVICES—Power Press
Wiesman Mfg. Co., Dayton, Ohio.

SAFETY DEVICES AND SUPPLIES
Weldit Acetylene Co., Detroit, Mich.

SAND—Molding
Pettinos, Geo. F., Philadelphia, Pa.
Rogers Brown & Crocker Bros., Inc., 21 East 40th Street, New York City.

SAND—Sand Blast
Cape May Sand Co., Cape May, N. J.
Paxson, J. W., Co., Philadelphia, Pa.
Pettinos, Geo. F., Philadelphia, Pa.
Portage Silica Co., The, Youngstown, O.

SAND—Steel Molding
Cape May Sand Co., Cape May, N. J.
Portage Silica Co., The, Youngstown, O.

SAND BLAST EQUIPMENT & MACHINES
American Fdry. Equip. Co., Mishawaka, Ind.
Arcade Mfg. Co., Freeport, Ill.
Koven, L. O., & Bro., Inc., Jersey City, N. J.
Mott Sand Blast Mfg. Co., Inc., Chicago, Ill.
Pangborn Corporation, Hagerstown, Md.
Paxson, J. W., Co., Philadelphia, Pa.
Sly, W. W., Mfg. Co. Cleveland, O.

SAND BLAST SHOT AND GRIT
Pangborn Corporation, Hagerstown, Md.

SAND CUTTING AND SCREENING MACHINES
American Fdry. Equip. Co., Mishawaka, Ind.

SAND HANDLING EQUIPMENT
Bartlett, C. O., & Snow Co., Cleveland, O.
Hayward Co., The, 50 Church St., N. Y. C.
National Engineering Co., Chicago, Ill.

SAND MILLS
National Engineering Co., Chicago, Ill.

SAND RAMMERS
Chicago Pneumatic Tool Co., 6 East 44th St., New York City.
Ingersoll-Rand Co., 11 B'way, N. Y. C.

SANDING MACHINES
Porter-Cable Mch. Co., Syracuse, N. Y.

SASH OPERATING DEVICES
Truscon Steel Co., Youngstown, O.

SASH—Steel
Truscon Steel Co., Youngstown, Ohio.

SAWING MACHINES—Band for Wood or Metal
American Saw Mill Mchry. Co., 181 Main St., Hackettstown, N. J.
Diamond Saw & Stamping Wks., Buffalo, N. Y.
Stockbridge Mch. Co., Worcester, Mass.
Thompson, Henry G., & Son Co., The, New Haven, Conn.

SAWING MACHINES—Metal
Earle Gear & Mch. Co., Philadelphia, Pa.
Espen-Lucas Mach. Works, Philadelphia, Pa.

SAWS—Bands for Metal
Armstrong-Blum Mfg. Co., Chicago, Ill.
Disston, Henry, & Sons, Inc., Philadelphia, Pa.
Simonds Saw & Steel Co., Fitchburg, Mass.
Starrett, L. S., Co., The, Athol, Mass.
Thompson, Henry G., & Son Co., The, New Haven, Conn.

SAWS—Circular Metal
Disston, Henry, & Sons, Inc., Philadelphia, Pa.
Hunter Saw & Machine Co., 5660 Butler St., Pittsburgh, Pa.
Simonds Saw & Steel Co., Fitchburg, Mass.

SAWS—Cold Metal
Disston, Henry, & Sons, Inc., Philadelphia, Pa.

SAWS—Friction
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

SAWS—Hack Saw Blades
Darwin & Milner, Inc., Cleveland, Ohio.
Disston, Henry, & Sons, Inc., Philadelphia, Pa.
Peerless Machine Co., Racine, Wis.
Thompson, Henry G., & Son Co., The, New Haven, Conn.

SAWS—Hot Metal
Disston, Henry, & Sons, Inc., Philadelphia, Pa.
Hunter Saw & Machine Co., 5660 Butler St., Pittsburgh, Pa.

SAWS—Inserted Tooth, Cold
Disston, Henry, & Sons, Inc., Philadelphia, Pa.
Hunter Saw & Machine Co., 5660 Butler St., Pittsburgh, Pa.
Simonds Saw & Steel Co., Fitchburg, Mass.

SAWS—Screw Slotting
Disston, Henry, & Sons, Inc., Philadelphia, Pa.
Simonds Saw & Steel Co., Fitchburg, Mass.

SAWS—Sliding Frame
United Engrg. & Fdry. Co., Pittsburgh, Pa.

SCRAP—Iron and Steel
Briddell, W. C., Co., Inc., Baltimore, Md.
Leaf E. B., Co., Philadelphia, Pa.
Luria Bros. & Co., Inc., Woolworth Bldg., New York City.
Perry, Buxton Doane Co., Boston, Mass.
Potts, Henry, & Co., Philadelphia, Pa.

SCRAP METAL—Non-Ferrous
Smith, Morton B., Co., 243 Front St., N. Y. C.

SCREENS—Perforated Metal
Chicago Perforating Co., Chicago, Ill.
Cross Engineering Co., Carbondale, Pa.
Erdle Perforating Co., Rochester, N. Y.
Harrington & King Perforating Co., Chicago.
Hendrick Mfg. Co., Carbondale, Pa.
Mundt, Chas., & Sons, Jersey City, N. J.
Remaly Mfg. Company, Tamaqua, Pa.
Wickwire Spencer Steel Co., 41 E. 42nd St., N. Y. C.

SCREENS—Vibrating
Link-Belt Co., Chicago, Ill.

SCREENS—Woven Wire
Ludlow-Saylor Wire Co., 600-610 Newstead Ave., St. Louis, Mo.
Manganese Steel Forge Co., Philadelphia, Pa.
Wickwire Spencer Steel Co., 41 E. 42nd St., N. Y. C.

SCREW DRIVERS—Portable Electric
U. S. Electrical Tool Co., Cincinnati, Ohio.

SCREW MACHINE PRODUCTS
Barnes, Wallace, Co., The, Bristol, Ct.
Bell, David, Co., Inc., The, Buffalo, N. Y.
Blake & Johnson Co., Waterbury, Ct.
Brown Bag Filling Machine Co., The, Fitchburg, Mass.
Brown-McLaren Mfg. Co., Detroit, Mich.
Clark, Cadle Harmon Corp., Rochester, N. Y.
Cleveland Cap Screw Co., The, Cleveland, O.
Corbin Screw Corp., New Britain, Ct.
Eastern Mch. Screw Corp., New Haven, Conn.
Ericsson Screw Mach. Prod. Co., Inc., 610 Bergen St., Brooklyn, N. Y.
Hartford Machine Screw Co., Hartford, Conn.
Haskell, Wm. H., Mfg. Co., Pawtucket, R. I.
Imsande Screw Products Co., Cincinnati, Ohio.
Industrial Mchry. Corp., Jersey City, N. J.
Machinery Products Corp., Chicago, Ill.
Michigan Screw Company, Lansing, Mich.
National Acme Co., Cleveland, Ohio.
Newton Mfg. Co., Plainville, Ct.
Ottemiller, Wm. H., Co., Inc., York, Pa.
Penn Screw & Machine Works, Phila., Pa.
Progressive Mfg. Co., Torrington, Ct.
Scovill Mfg. Co., Waterbury, Ct.
Screw Machine Products Corp., Providence, R. I.
Sherwood Mfg. Co., Buffalo, N. Y.
Shimer, Samuel J., & Sons, Inc., Milton, Pa.
Torrington Co., Torrington, Ct.
Wahl Co., The, Chicago, Ill.
Warner Brothers Co., Bridgeport, Ct.
Western Screw Products Co., St. Louis, Mo.
Wright Machine Company, Worcester, Mass.

SCREW MACHINERY—Automatic
Brown & Sharpe Mfg. Co., Providence, R. I.
Cone Automatic Mach. Co., Inc., Windsor, Vt.
National Acme Co., Cleveland, Ohio.

SCREW MACHINERY—Automatic Wood
Cook, Asa S., Co., Hartford, Ct.

SCREW MACHINERY—Hand
Jones & Lamson Mch. Co., Springfield, Vt.

SCREW MACHINERY—Multiple Spindle
Acme Machine Tool Company, Cincinnati, O.
Cone Automatic Mach. Co., Inc., Windsor, Vt.
National Acme Co., Cleveland, Ohio.

SCREW MACHINERY—Second-Hand
Harris Bros. Co., Chicago, Ill.
Hill, Clarke & Co., Inc., Boston, Mass.

SCREW PLATES
Greenfield Tap & Die Corp., Greenfield, Mass.

SCREWS—Cap
Clark Bros. Bolt Co., Millidale, Ct.
Cleveland Cap Screw Co., The, Cleveland, O.
Corbin Screw Corp., New Britain, Ct.
Ferry Cap & Set Screw Co., Cleveland, Ohio.
Foster Bolt & Nut Co., The, Cleveland, Ohio.
Hartford Machine Screw Co., Hartford, Conn.
International Tool & Supply Co., Buffalo, N. Y.
National Acme Co., Cleveland, Ohio.
Ottemiller, Wm. H., Co., Inc., York, Pa.
Scovill Mfg. Co., Waterbury, Ct.
Shimer, Samuel J., & Sons, Inc., Milton, Pa.
Standard Pressed Steel Co., Jenkintown, Pa.
Strong, Carlisle & Hammond Co., The, Cleveland, O.

SCREWS—Coach and Lag
Haskell, Wm. H., Mfg. Co., Pawtucket, R. I.
Pawtucket Mfg. Co., Pawtucket, R. I.

SCREWS—Cold Headed
Cleveland Cap Screw Co., The, Cleveland, O.

SCREWS—Machine
American Screw Co., Providence, R. I.
Blake & Johnson Co., Waterbury, Ct.
Brown-McLaren Mfg. Co., Detroit, Mich.
Corbin Screw Corp., New Britain, Ct.
Ericsson Screw Mach. Prod. Co., Inc., 619 Bergen St., Brooklyn, N. Y.
Hubbell, Harvey, Inc., Bridgeport, Ct.
Progressive Mfg. Co., Torrington, Ct.
Scovill Mfg. Co., Waterbury, Ct.
Warner Brothers Co., Bridgeport, Ct.

SCREWS—Safety Set
Allen Mfg. Co., The, Hartford, Ct.
Bristol Co., Waterbury, Ct.
Hartford Mach. Screw Co., Hartford, Ct.
Progressive Mfg. Co., Torrington, Ct.
Standard Pressed Steel Co., Jenkintown, Pa.
Strong, Carlisle & Hammond Co., The, Cleveland, O.

SCREWS—Set
Ericsson Screw Mach. Prod. Co., Inc., 610 Bergen St., Brooklyn, N. Y.
Hartford Mach. Screw Co., Hartford, Ct.
National Acme Co., Cleveland, Ohio.
Ottemiller, Wm. H., Co., Inc., York, Pa.
Shimer, Samuel J., & Sons, Inc., Milton, Pa.
Standard Pressed Steel Co., Jenkintown, Pa.
Strong, Carlisle & Hammond Co., The, Cleveland, O.

SCREWS—Thumb Malleable
Philadelphia Hardware & Malleable Iron Wks., Inc., Philadelphia, Pa.

SCREWS—Wood
American Screw Co., Providence, R. I.
Bridgeport Screw Co., Bridgeport, Ct.

SECOND-HAND MACHINERY—See Clearing House Section
Adams, Ogden R., Co., Inc., Rochester, N. Y.
Bennett Mchry. Co., 30 Church St., N. Y. C.
Botwinik Bros., Inc., New Haven, Conn.
Brearley, H. P., 90 West St., New York City.
Briggs, Marvin, Inc., 167 Sixth St., Brooklyn, N. Y.
Calleson, C. A., 50 Church St., N. Y. C.
Cincinnati Mchry. & Supply Co., Cincinnati, O.
Cohen, Frank L., Inc., Buffalo, N. Y.
Crane-Schiefer-Owens, Inc., Buffalo, N. Y.
Delaware Electric & Supply Co., Wilmington, Del.
Donahue Steel Prod. Co., Chicago, Ill.
Eastern Machinery Co., Cincinnati, Ohio.
Essley, E. L. Mchy. Co., Chicago, Ill.
Factory & Mill Supply Co., Boston, Mass.
Harris Bros. Co., Chicago, Ill.
Hill, Clarke & Co., Inc., Boston, Mass.
Hill, Clarke & Co. of Chicago, 647 W. Washington Blvd., Chicago, Ill.
Hitner's, Henry A., Sons Co., Philadelphia, Pa.
Ideal Machinery Co., Plainville, Conn.
Industrial Mchry. Corp., Jersey City, N. J.
Jansson Machinery Exchange, 231 Centre St., New York City.
Johnson, Wm. C., & Sons, Mchry. Co., St. Louis, Mo.
Jones Machine Tool Co., Cincinnati, O.
Lamberg, A., & Co., 241 Centre St., N. Y. C.
Larkin, M. D., Co., Dayton, O.
Liberty Pattern Works, Rochester, N. Y.
Lodge & Shipley Mch. Tool Co., Cincinnati, O.
Lucas, J. L., & Son, Inc., Bridgeport, Conn.
Lynd-Farquhar Co., Boston, Mass.
McCabe, J. J., Lathe & Mchry. Corp., 149 Broadway, New York City.
McCabe & Sheeran Machinery Corp., Room 482, 50 Church St., New York City.
McCoy-Brandt Machinery Co., Pittsburgh, Pa.
Miles Mchry. Co., Saginaw, W. S. Mich.
Moore & MacDonald, 26 Cortlandt St., N. Y. C.
Morey & Co., Inc., 410 Broome St., N. Y. C.
Nashville Industrial Corp., Old Hickory, Tenn.
Niles, F. H., & Co., Inc., Woolworth Bldg., New York City.
Nilson, A. H., Mach. Co., Bridgeport, Ct.
Norton-Broadway Mchry. Co., Cincinnati, Ohio
O'Brien Machry. Co., Philadelphia, Pa.
Osborne & Sexton Mchry. Co., Columbus, O.
Power Machinery, Inc., Jersey City, N. J.
Prentiss, Henry, & Co., Inc., 149 Broadway, New York City.
Prussian, M., Mchry. Co., Detroit, Mich.
Quickwork Co., St. Marys, Ohio.
Randle Mchry. Co., Cincinnati, Ohio.
Reliance Machy. Sales Co., Pittsburgh, Pa.
Richey-Whaley Mchry. Co., Indianapolis, Ind.
Riverside Mchry. Depot, Detroit, Mich.
Ross Power Equip. Co., Indianapolis, Ind.
Russell Machine Co., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Scully-Jones & Co., Chicago, Ill.
Severin-Tripp Mchry. Co., 25 Church St., New York City.
Simmons Mach. Tool Corp., Albany, N. Y.
Stocker-Rumely-Wachs Co., Chicago, Ill.
Strong, Homer & Co., Inc., 285 State St., Rochester, N. Y.
Sun Mchry. Co., Inc., Newark, N. J.
Tippins & Sprengle, Pittsburgh, Pa.
Ullman, Jacob, Buffalo, N. Y.
Walsh, J. T., Buffalo, N. Y.
White, A. D., Machry. Co., Chicago, Ill.
Wickes Machinery Co., Jersey City, N. J.

SEPARATORS—Magnetic
Dings Magnetic Separator Co., Milwaukee, Wis.
Electric Controller & Mfg. Co., Cleveland, O.

SEPARATORS—Oil from Chips
Ideal Concrete Machry. Co., Cincinnati, O.

SHAFTING—Cold Drawn
Bethlehem Steel Company, Bethlehem, Pa.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Union Drawn Steel Co., Beaver Falls, Pa.

SHAFTING—Flexible
Chicago Flexible Shaft Co., Chicago, Ill.
Fischer, Chas., Spring Co., 240 Kent Ave., Brooklyn, N. Y.
Stow Mfg. Co., Inc., Binghamton, N. Y.

SHAFTING—Steel
Ullman, Jacob, Buffalo, N. Y.

SHAFTING—Tubular Material for
National Tube Co., Pittsburgh, Pa.

SHAFTING—Turned and Polished
Fitzsimons Co., Youngstown, Ohio.
Medart Co., The, St. Louis, Mo.
Union Drawn Steel Co., Beaver Falls, Pa.

SHAFTS—Forged
Jersey Forging Wks., Jersey City, N. J.

SHAPES—Cold Drawn
Union Drawn Steel Co., Beaver Falls, Pa.

SHAPES—Cold Rolled
Kawneer Co., Niles, Mich.
Metal Forming Corp., Elkhart, Ind.

SHAPES—Steel
Phoenix Iron Co., Philadelphia, Pa.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

SHAPING MACHINES—Horizontal
American Tool Works Co., Cincinnati, O.
Cincinnati Shaper Co., The, Cincinnati, O.
Columbia Mch. Tool Co., The, Hamilton, Ohio.
Gould & Eberhardt, Newark, N. J.
Kelly, R. A., Co., The, Xenia, Ohio.
Ohio Machine Tool Co., Kenton, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Smith & Mills Company, Cincinnati, O.
Stockbridge Machine Co., Worcester, Mass.

SHEAR BLADES
Heppenstall Forge & Knife Co., Pitts., Pa.
Marshalltown Mfg. Co., Marshalltown, Iowa.
Pittsburgh Knife & Forge Co., Corsopolis, Pa.
Wapakoneta Machine Company, Wapakoneta, O.

SHEARING MACHINES—Alligator
Doelger & Kirsten, 3105 Chambers St., Milwaukee, Wis.
Hendley & Whittemore Co., Beloit, Wis.
United Engrg. & Fdry. Co., Pittsburgh, Pa.

SHEARING MACHINES—Automatic Alligator
Doelger & Kirsten, 3105 Chambers St., Milwaukee, Wis.

SHEARING MACHINES—Bar
Buffalo Forge Co., 492 B'way, Buffalo, N. Y.
Cleveland Punch & Shear Wks. Co., Cleve., O.
Standard Engineering Co., Ellwood City, Pa.

SHEARING MACHINES—Billet
Morgan Engineering Co., Alliance, O.
Thomas Spacing Machine Co., Pittsburgh, Pa.
United Engrg. & Fdry. Co., Pittsburgh, Pa.

SHEARING MACHINES — Doubling and Squaring
Streine Tool & Mfg. Co., The, New Bremen, O.
United Engrg. & Fdry. Co., Pittsburgh, Pa.

SHEARING MACHINES—Metal Slitting
Buffalo Forge Co., 492 B'way, Buffalo, N. Y.
Hendley & Whittemore Co., Beloit, Wis.
Streine Tool & Mfg. Co., The, New Bremen, O.

SHEARING MACHINES — Metal Slitting Gang
Adriance Mach. Works, Inc., 82 Richards St., Brooklyn, N. Y
Yoder Co., The, Cleveland, O.

SHEARING MACHINES—Plate
Beatty Machine & Mfg. Co., Hammond, Ind.
Bertsch & Co., Cambridge City, Ind.
Cleveland Punch & Shear Wks., Cleveland, O.
Loy & Nawrath Division Birmingham Iron Foundry, Derby, Ct.
Marshalltown Mfg. Co., Marshalltown, Ia.
Mesta Machine Co., Pittsburgh, Pa.
Morgan Engineering Co., Alliance, O.
Niagara Mach. & Tool Wks., Buffalo, N. Y.
Peck, Stow & Wilcox Co., Southington, Ct.

Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Streine Tool & Mfg. Co., The, New Bremen, O.
Thomas Spacing Machine Co., Pittsburgh, Pa.
United Engrg. & Fdry. Co., Pittsburgh, Pa.
Wood, R. D., & Company, Philadelphia, Pa.

SHEARING MACHINES—Rotary for Irregular Cutting

Lake Erie Engineering Corp., Buffalo, N. Y.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

SHEARING MACHINES—Sheet, Automatic

Streine Tool & Mfg. Co., The, New Bremen, O.

SHEET BARS

Andrews Steel Co., Newport, Ky.

SHEET METAL MACHINERY

Adriance Machine Works, Inc., 82 Richards St. Brooklyn, N. Y.
Bliss, E. W., Co., 53d St. & 2d Ave., Brooklyn, N. Y.
Consolidated Mch. Tool Corp. of America, Rochester, N. Y.
Dreis & Krump Mfg. Co., Chicago, Ill.
Kane & Roach, Syracuse, N. Y.
Leffler, Chas., & Co., 61 Clymer St., Brooklyn, N. Y.
Loy & Nawrath Division Birmingham Iron Foundry, Derby, Conn.
Niagara Machine & Tool Works, Buffalo, N. Y.
Ohl, George A., & Co., Inc., Newark, N. J.
Peck, Stow & Wilcox Co., Southington, Ct.
Rafter Machine Co., Belleville, N. J.
Robinson, J. M., Mfg. Co., Cincinnati, O.
Streine Tool & Mfg. Co., The, New Bremen, O.
Standard Machinery Co., Auburn, R. I.
Toledo Machine & Tool Co., Toledo, O.
V. & O. Press Co., Hudson, N. Y.
Yoder Co., The, Cleveland, O.

SHEETS—Aluminum

Erdle Perforating Co., Rochester, N. Y.

SHEETS—Auto Body

Allegheny Steel Co., Brackenridge, Pa.
American Sheet & Tin Plate Co., Pittsburgh, Pa.
Central Alloy Steel Corp., Massillon, Ohio
Newton Steel Co., Youngstown, O.
Seneca Iron & Steel Co., Buffalo, N. Y.
United Alloy Steel Corp., Canton, Ohio.
Wheeling Steel Corp., Wheeling, W. Va.

SHEETS—Black

Allegheny Steel Co., Brackenridge, Pa.
American Sheet & Tin Plate Co., Pittsburgh, Pa.
Bethlehem Steel Company, Bethlehem, Pa.
Central Alloy Steel Corp., Massillon, Ohio
Inland Steel Company, Chicago, Ill.
Michigan Steel Corp., Ecorse, Detroit, Mich.
Newton Steel Co., Youngstown, O.
Republic Iron & Steel Co., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Seneca Iron & Steel Co., Buffalo, N. Y.
Sharon Steel Hoop Co., Sharon, Pa.
Sheet Steel Trade Extension Committee, Pittsburgh, Pa.
Trumbull Steel Company, The, Warren, O.
United Alloy Steel Corp., Canton, Ohio.
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.

SHEETS—Blue Annealed

Allegheny Steel Co., Brackenridge, Pa.
American Sheet & Tin Plate Co., Pittsburgh, Pa.
Apollo Steel Co., Apollo, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Central Alloy Steel Corp., Massillon, Ohio
Central Iron & Steel Co., Harrisburg, Pa.
Eddystone Steel Co., Crum Lynne, Pa.
Inland Steel Company, Chicago, Ill.
Newport Rolling Mill Co., Newport, Ky.
Republic Iron & Steel Co., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Sharon Steel Hoop Co., Sharon, Pa.
Sheet Steel Trade Extension Committee, Pittsburgh, Pa.
Trumbull Steel Company, The, Warren, O.
United Alloy Steel Corp., Canton, Ohio.
Wood, Alan, Iron & Steel Co., Phila., Pa.

SHEETS—Brass, Bronze, Copper or Nickel Silver

American Brass Co., Waterbury, Ct.
Copper & Brass Research Assn., 25 B'way, New York City.
Conklin, T. E., Brass & Copper Co., Inc., 54 Lafayette St., New York City.
Seymour Mfg. Co., Seymour, Conn.

SHEETS—Electrical

Allegheny Steel Co., Brackenridge, Pa.
American Sheet & Tin Plate Co., Pitts., Pa.
Central Alloy Steel Corp., Massillon, Ohio
Sheet Steel Trade Extension Committee, Pittsburgh, Pa.
Trumbull Steel Company, The, Warren, O.
United Alloy Steel Corp., Canton, Ohio.

SHEETS—Enameling Stock

American Sheet & Tin Plate Co., Pittsburgh, Pa.
Newton Steel Co., Youngstown, O.
Seneca Iron & Steel Co., Buffalo, N. Y.
Sheet Steel Trade Extension Committee, Pittsburgh, Pa.
United Alloy Steel Corp., Canton, Ohio.

SHEETS—For Drawing and Stamping

Allegheny Steel Co., Brackenridge, Pa.
American Sheet & Tin Plate Co., Pittsburgh, Pa.
Central Alloy Steel Corp., Massillon, Ohio
Columbia Steel Co., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Michigan Steel Corp., Ecorse, Detroit, Mich.
Newton Steel Co., Youngstown, O.
Seneca Iron & Steel Co., Buffalo, N. Y.
Sharon Steel Hoop Co., Sharon, Pa.
Sheet Steel Trade Extension Committee, Pittsburgh, Pa.
United Alloy Steel Corp., Canton, Ohio.

SHEETS—Full Finished

American Sheet & Tin Plate Co., Pittsburgh, Pa.
Central Alloy Steel Corp., Massillon, Ohio
Newton Steel Co., Youngstown, O.
Seneca Iron & Steel Co., Buffalo, N. Y.
United Alloy Steel Corp., Canton, Ohio.

SHEETS—Galvanized, Flat and Corrugated

American Sheet & Tin Plate Co., Pittsburgh, Pa.
Apollo Steel Co., Apollo, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Inland Steel Company, Chicago, Ill.
Newport Rolling Mill Co., Newport, Ky.
Republic Iron & Steel Co., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Sheet Steel Trade Extension Committee, Pittsburgh, Pa.
Trumbull Steel Co., The, Warren, O.
United Alloy Steel Corp., Canton, Ohio.
Weirton Steel Co., Weirton, W. Va.

SHEETS—Metal Furniture

American Sheet & Tin Plate Co., Pittsburgh, Pa.
Central Alloy Steel Corp., Massillon, Ohio
Newton Steel Co., Youngstown, O.
Seneca Iron & Steel Co., Buffalo, N. Y.
United Alloy Steel Corp., Canton, Ohio.

SHEETS—Phosphor Bronze

American Brass Co., Waterbury, Conn.
Phosphor Bronze Smelting Co., Phila., Pa.
Seymour Mfg. Co., Seymour, Ct.

SHELVING—Steel

Cleveland Wire Spring Co., Cleveland, O.
United Alloy Steel Corp., Canton, O.

SHIP BUILDERS' MATERIAL

Bethlehem Steel Company, Bethlehem, Pa.

SHOT FOR SAND BLAST—See Sand Blast Shot and Grit

SHOVELS—Gasoline

Brown Hoisting Mchry. Co., Cleveland, O.

SHUTTERS—Steel and Wood Bi-Folding

Kinnear Mfg. Co., Columbus, O.

SKIM GATES

Sterling Wheelbarrow Co., Milwaukee, Wis.

SLABS

Andrews Steel Co., Newport, Ky.
Columbia Steel Co., Pittsburgh, Pa.

SLABS—Cement Roofing

Federal Cement Tile Co., Chicago, Ill.

SLINGS—Wire Rope

American Cable Co., Inc., 105 Hudson St., N. Y. C.
Roebling's, John A., Sons Co., Trenton, N. J.

SLOTTING MACHINES

Consolidated Mch. Tool Corp. of America, Rochester, N. Y.
Nazel Engrg. & Mch. Wks., Philadelphia, Pa.
Niles-Bement-Pond Co., 111 B'way, N. Y. C.

SOCKETS—Wire Rope

Chicago Steel Fdry. Co., Chicago, Ill.

SPACING TABLES—Punching and Shearing

Thomas Spacing Machine Co., Pittsburgh, Pa.

SPECIAL MACHINERY

Adamson Machine Co., Akron, Ohio.
Bethlehem Steel Co., Bethlehem, Pa.
Bullard Machine Tool Co., Bridgeport, Ct.
Columbia Mch. Tool Co., The, Hamilton, Ohio.
Columbia Mch. Works & Malleable Iron Co., 269 Chestnut St., Brooklyn, N. Y.
Cook, Asa S., Co., Hartford, Ct.
Cowdrey, C. H., Machine Works, 30 Summer St., Fitchburg, Mass.
Doelger & Kirsten, 3105 Chambers St., Milwaukee, Wis.
Eastern Tool & Mfg. Co., Bloomfield, N. J.
Fawcus Mach. Co., Pittsburgh, Pa.
Hartford Special Machinery Co., The, Hartford, Ct.
Leffler, Charles & Co., 61 Clymer St., Brooklyn, N. Y.
Littell, F. J., Mach. Co., Chicago, Ill.
Manville, E. J., Machine Co., Waterbury, Ct.
Mehl Machine Tool & Die Co., Roselle, N. J.
Mesta Machine Co., Pittsburgh, Pa.
Morgan Engineering Co., Alliance, O.
Steel, R., & Sons, Inc., 482-486 Vernon Ave., Long Island City, N. Y.
Treadwell Engineering Co., Easton, Pa.
York Electric & Mach. York, Pa.

SPEED REDUCERS

Albaugh-Dover Mfg. Co., Chicago, Ill.
Boston Gear Wks. Sales Co., Norfolk Downs, Mass.
Cleveland Worm & Gear Co., Cleveland, O.
Foote Bros. Gear & Mach. Co., Chicago, Ill.
Ganschow, Wm., Chicago, Ill.
Jones, W. A., Foundry & Mach. Co., 4434 W. Roosevelt Road, Chicago, Ill.
Philadelphia Gear Wks., Philadelphia, Pa.
Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.

SPIKES

American Steel & Wire Co., Chicago, Ill.
Ames, W., & Co., Jersey City, N. J.
Bethlehem Steel Company, Bethlehem, Pa.
Foster, L. B., Co., Inc., Pittsburgh, Pa.
Pottsville Bolt Co., Inc., Pottsville, Pa.

SPRING MAKING MACHINERY

Baird Machine Co., Bridgeport, Ct.
Sleeper & Hartley, Inc., Worcester, Mass.

SPRINGS—Car

American Steel & Wire Co., Chicago, Ill.

SPRINGS—Wire, Coil or Flat

Advance Spring & Wire Co., Chicago, Ill.
American Spring & Mfg. Corp., Holley, Mich.
American Steel & Wire Co., Chicago, Ill.
Barnes-Gibson-Raymond, Inc., Detroit, Mich.
Barnes, Wallace, Co., The, Bristol, Ct.
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Wire Spring Co., Cleveland, O.
Cook Spring Co., Ann Arbor, Mich.
Cuyahoga Spring Co., Cleveland, O.
Dunbar Bros. Co., Bristol, Ct.
Everitt Co., The, Boston, Mass.
Fischer, Chas., Spring Co., 240 Kent Ave., Brooklyn, N. Y.
Gibson, Wm. D., Co., Chicago, Ill.
Hubbard, M. D., Spring Co., Pontiac, Mich.
Lee Spring Company, Inc., 30 Main St., Bklyn, N. Y.
Miller & Van Winkle, Inc., 18 Bridge St., Brooklyn, N. Y.
Newcomb Spring Corp., 234 40th St., Brooklyn, N. Y.
Peterson Spring Co., Detroit, Mich.
Raymond Mfg. Co., Corry, Pa.
U. S. Steel Wire Spring Co., The, Cleveland, Ohio.
Washburn Wire Co., 118th St. & Harlem River, New York City.
Wickwire Spencer Steel Co., 41 E. 42nd St., N. Y. C.

SPROCKETS

American High Speed Chain Co., Indianapolis, Ind.
Cullman Wheel Co., Chicago, Ill.
Dundore Mfg. Co., Reading, Pa.
Link-Belt Co., Chicago, Ill.
Union Chain & Mfg. Co., Sandusky, O.

STACKS—Steel

Chicago Bridge & Iron Works, Chicago, Ill.
Hendrick Manufacturing Co., Carbondale, Pa.

STAMPINGS OR DRAWINGS—Metal

Acme Stpg. & Mfg. Co., Pittsburgh, Pa.
American Pulley Co., Philadelphia, Pa.
American Spring & Mfg. Corp., Holley, Mich.
American Tube & Stpg. Plant, The (The Stanley Works), Bridgeport, Ct.
Barnes, Wallace, Co., The, Bristol, Ct.
Bay State Stamping Co., Worcester, Mass.
Bettcher Stamping & Mfg. Co., Cleveland, O.
Bossert Corp., The, Utica, N. Y.
Bridgeport Metal Goods Mfg. Co., Bridgeport, Ct.
Brown, M. J., Mfg. Co., Philadelphia, Pa.
Burgess-Norton Mfg. Co., Geneva, Ill.
Central Iron & Steel Co., Harrisburg, Pa.
Cook, H. C., Co., Ansonia, Conn.
Crosby Co., The, Buffalo, N. Y.
Cuyahoga Spring Co., Cleveland, O.
Detroit Stamping Co., Detroit, Mich.
Douglas & Lomason Co., Detroit, Mich.
Eastern Tool & Stpg. Co., Inc., Saugus, Mass.
Erdle Perforating Co., Rochester, N. Y.
G. G. G. Metal Stpg. Co., Dept. A., Warren, Pa.
General Machine & Mfg. Co., The, Bridgeport, Conn.
Geuder, Paeschke & Frey Co. (Contract Mfg. Division), Milwaukee, Wis.
Globe Mach. & Stpg. Co., Cleveland, O.
Gray, Peter, & Sons, Inc., Cambridge, Mass.
Great Lakes Pressed Steel Corp., Buffalo, N. Y.
Harry Brothers Mfg. Co., Detroit, Mich.
Heintz Mfg. Co., Philadelphia, Pa.
Hubbard, M. D., Spring Co., Pontiac, Mich.
Jahn, B., Mfg. Co., The, New Britain, Conn.
Jenkinson, R. C., & Co., Newark, N. J.
Kirby Mfg. Co., The, Middletown, Ct.
Konigslow, E., Stamping & Tool Co., The, Cleveland, O.
Konigslow, Otto, Mfg. Co., Cleveland, O.
Lansing Stpg. Co., Lansing, Mich.
M. H. Metal Products Corp., 1154 Flushing Ave., Brooklyn, N. Y.
Matthews, H. A., Mfg. Co., Seymour, Ct.
Matthews Mfg. Co., Worcester, Mass.
Metal Specialty Co., Cincinnati, O.
National Marine Lamp Co., Forestville, Conn.
National Umbrella Frame Co., Philadelphia, Pa.
New England Pressed Steel Co., Natick, Mass.
Robinson Tool Works, Inc., Waterbury, Conn.
Rome Mfg. Company, Rome, N. Y.
Root Co., Bristol, Conn.
Scovill Mfg. Co., Waterbury, Ct.
Sessions, J. H., & Son, Bristol, Ct.
Sexton Can Company, Inc., Everitt, Mass.
Sheet Metal Prod. Co., The, Kansas City, Mo.
Torrington Co., Torrington, Ct.
Transue & Williams Steel Forging Corp., Alliance, O.
Truscon Steel Co., Youngstown, O.
Tucker, M., & Co., Philadelphia, Pa.
Warner Brothers Co., Bridgeport, Ct.
Wheeler Radiator & Mfg. Co., The, Cleveland, Ohio.
Worcester Stamped Metal Co., Worcester, Mass.

STAMPS—Steel Alphabets and Figures

Schwerdtle Stamp Co., Bridgeport, Ct.

STANDPIPES

Lancaster Iron Works, Inc., Lancaster, Pa.

STAPLE MACHINES

Sleeper & Hartley, Inc., Worcester, Mass.

STAPLES

American Steel & Wire Co., Chicago, Ill.

STARS—Tumbling Mill
Canton Malleable Iron Co., Canton, Ohio.

STEEL—Alloy
Allen, Edgar, Steel Company, Chicago, Ill.
Bethlehem Steel Company, Bethlehem, Pa.
Central Alloy Steel Corp., Massillon, Ohio
Driver-Harris Co., Harrison, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
Hawkridge Bros. Company, Boston, Mass.
Heller Bros. Co., Newark, N. J.
Interstate Iron & Steel Co., Chicago, Ill.
Jessop Steel Co., Washington, Pa.
Jessop, Wm., & Sons, Inc., 91 John St., New York City.
Ludlum Steel Co., Watervliet, N. Y.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Simonds Saw & Steel Co., Lockport, N. Y.
United Alloy Steel Corp., Canton, O.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

STEEL—Alloy, Cold Drawn
Union Drawn Steel Co., Beaver Falls, Pa.

STEEL—Bright Finished
Union Drawn Steel Co., Beaver Falls, Pa.

STEEL—Carbon
Carnegie Steel Co., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.

STEEL—Chrome
Central Alloy Steel Corp., Massillon, Ohio

STEEL—Chrome Manganese
Wheelock, Lovejoy & Company, Inc., Cambridge, Mass.

STEEL—Chrome Nickel
Andrews Steel Co., Newport, Ky.
Central Alloy Steel Corp., Massillon, Ohio

STEEL—Chrome Vanadium
Andrews Steel Co., Newport, Ky.
Central Alloy Steel Corp., Massillon, Ohio
Vulcan Crucible Steel Co., Aliquippa, Pa.

STEEL—Cold Drawn
American Steel & Wire Co., Chicago, Ill.
Bethlehem Steel Company, Bethlehem, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Fitzsimons Co., Youngstown, Ohio.
Globe Wire Company, Sharpsburg, Pa.
Pittsburgh Tool Steel Wire Co., Monaca, Pa.
Union Drawn Steel Co., Beaver Falls, Pa.
Wetherell Bros. Co., Cambridge, 39, Mass.

STEEL—Cold Rolled Strips
Acme Steel Co., Chicago, Ill.
American Steel & Wire Co., Chicago, Ill.
American Tube & Stpg. Plant, The (The Stanley Works), Bridgeport, Ct.
Athenia Steel Co., 135 William St., N. Y. C.
Columbia Steel Co., Pittsburgh, Pa.
Griffin Mfg. Company, Erie, Pa.
Hind Steel Co., Inc., Union, Union County, N. J.
Morris & Bailey Division Oliver Iron & Steel Corp., Pittsburgh, Pa.
National Umbrella Frame Co., Philadelphia, Pa.
Roland Steel Co., Inc., 114 Liberty Street, N. Y. C.
Stanley Works, New Britain, Conn.
Superior Steel Corp., Union Trust Bldg., Pittsburgh, Pa.
Trumbull Steel Company, The, Warren, O.
Washburn Wire Co., 118th St. & Harlem River, New York City.
Weirton Steel Co., Weirton, W. Va.
West Leechburg Steel Co., Pittsburgh, Pa.
Wetherell Bros. Co., Cambridge, 39, Mass.
Wickwire Spencer Steel Co., 41 E. 42nd St., N. Y. C.

STEEL—Cold Rolled Strips, Nickel Plated
Roland Steel Co., Inc., 114 Liberty Street, N. Y. C.

STEEL—Crucible
Colonial Steel Company, Pittsburgh, Pa.
Columbia Tool Steel Co., Chicago Heights, Ill.
Disston, Henry, & Sons, Inc., Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Jessop Steel Co., Washington, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

STEEL—Cutlery
Disston, Henry, & Sons, Inc., Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Firth, Thos., & Sons, Inc., Hartford, Ct.
Jessop Steel Co., Washington, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.
Wetherell Bros. Co., Cambridge, 39, Mass.

STEEL—Die
Bethlehem Steel Company, Bethlehem, Pa.
Central Alloy Steel Corp., Massillon, Ohio
Disston, Henry, & Sons, Inc., Philadelphia, Pa.
Dycast Steel Co., Collinsville, Conn.
Firth-Sterling Steel Co., McKeesport, Pa.
Ludlum Steel Co., Watervliet, N. Y.
Swedish Iron & Steel Corp., 66 Rutledge St., Brooklyn, N. Y.
Vulcan Crucible Steel Co., Aliquippa, Pa.

STEEL—Drill
Heller Bros. Co., Newark, N. J.
Kloster Steel Corp., Chicago, Ill.
Milne, A., & Co., 745 Washington St., N. Y. C.
Stulz-Sickles Co., Newark, N. J.
Swedish Iron & Steel Corp., 66 Rutledge St., Brooklyn, N. Y.
Ziv Steel & Wire Company, Chicago, Ill.

STEEL—Electric
Disston, Henry, & Sons, Inc., Philadelphia, Pa.
Driver-Harris Co., Harrison, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
Hawkridge Bros. Company, Boston, Mass.
United Alloy Steel Corp., Canton, O.

STEEL—High Speed
Allen, Edgar, Steel Company, Chicago, Ill.
Atlas Steel Corp., Dunkirk, N. Y.
Carpenter Steel Company, The, Reading, Pa.
Colonial Steel Company, Pittsburgh, Pa.
Columbia Tool Steel Co., Chicago Heights, Ill.
Disston, Henry, & Sons, Inc., Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Hawkridge Bros. Company, Boston, Mass.
Heller Bros. Co., Newark, N. J.
Jessop Steel Co., Washington, Pa.
Jessop, Wm., & Sons, Inc., 91 John St., New York City.
Latrobe Electric Steel Co., Latrobe, Pa.
Ludlum Steel Co., Watervliet, N. Y.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Simonds Saw & Steel Co., Lockport, N. Y.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

STEEL—Hot Rolled Strips
Acme Steel Co., Chicago, Ill.
American Tube & Stpg. Plant, The (The Stanley Works), Bridgeport, Ct.
Barnes, Wallace Co., The Bristol, Ct.
Central Alloy Steel Corp., Massillon, Ohio
Griffin Mfg. Company, Erie, Pa.
Laclede Steel Co., St. Louis, Mo.
Sharon Steel Hoop Co., Sharon, Pa.
Stanley Works, New Britain, Conn.
Superior Steel Corp., Union Trust Bldg., Pittsburgh, Pa.
Trumbull Steel Company, The, Warren, O.
West Leechburg Steel Co., Pittsburgh, Pa.

STEEL—Importers
Kloster Steel Corp., Chicago, Ill.
Swedish Iron & Steel Corp., 66 Rutledge St., Brooklyn, N. Y.

STEEL—Magnet
Disston, Henry, & Sons, Inc., Philadelphia, Pa.
Simonds Saw & Steel Co., Lockport, N. Y.

STEEL—Manganese
Era Steel Co., Bucyrus, Ohio.

STEEL—Manganese Rolled or Forged
Manganese Steel Forge Co., Philadelphia, Pa.

STEEL—Nickel
Andrews Steel Co., Newport, Ky.
Central Alloy Steel Corp., Massillon, Ohio

STEEL—Open Hearth
Driver-Harris Co., Harrison, N. J.
Pacific Coast Steel Co., San Francisco, Cal.
Sharon Steel Hoop Co., Sharon, Pa.
United Alloy Steel Corp., Canton, O.

STEEL—Rustless
Carpenter Steel Company, The, Reading, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Ludlum Steel Co., Watervliet, N. Y.

STEEL—Screw
American Steel & Wire Co., Chicago, Ill.
Fitzsimons Co., Youngstown, Ohio.
Union Drawn Steel Co., Beaver Falls, Pa.

STEEL—Special Analysis
West Leechburg Steel Co., Pittsburgh, Pa.
Central Alloy Steel Corp., Massillon, Ohio

STEEL—Spring
Athenia Steel Co., 135 William St., N. Y.
Barnes, Wallace, Co., The, Bristol, Ct.
Bethlehem Steel Company, Bethlehem, Pa.
Central Alloy Steel Corp., Massillon, Ohio
Patriarche & Bell, 351 West St., N. Y. C.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.

STEEL—Stainless
Allegheny Steel Co., Brackenridge, Pa.
Carpenter Steel Company, The, Reading, Pa.
Disston, Henry, & Sons, Inc., Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Firth, Thos., & Sons, Inc., Hartford, Ct.
Vulcan Crucible Steel Co., Aliquippa, Pa.

STEEL—Tool
Allen, Edgar, Steel Company, Chicago, Ill.
Atlas Steel Corp., Dunkirk, N. Y.
Bethlehem Steel Company, Bethlehem, Pa.
Carpenter Steel Company, The, Reading, Pa.
Colonial Steel Company, Pittsburgh, Pa.
Columbia Tool Steel Co., Chicago Heights, Ill.
Darwin & Milner, Inc., Cleveland, Ohio.
Disston, Henry, & Sons, Inc., Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Hawkridge Bros. Company, Boston, Mass.
Heller Bros. Co., Newark, N. J.
Jessop Steel Co., Washington, Pa.
Jessop, Wm., & Sons, Inc., 91 John Street, New York City.
Kloster Steel Corp., Chicago, Ill.
Latrobe Electric Steel Co., Latrobe, Pa.
Ludlum Steel Co., Watervliet, N. Y.
Milne, A., & Co., 745 Washington St., N. Y.
Patriarche & Bell, 351 West St., N. Y. C.
Potts, Horace T., & Co., Philadelphia, Pa.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Simonds Saw & Steel Co., Lockport, N. Y.
Stulz-Sickles Co., Newark, N. J.
Swedish Iron & Steel Corp., 66 Rutledge St., Brooklyn, N. Y.
Vulcan Crucible Steel Co., Aliquippa, Pa.
Wetherell Bros. Co., Cambridge 39, Mass.
Ziv Steel & Wire Company, Chicago, Ill.

STEEL—Tool, Special Shapes
Heller Bros. Co., Newark, N. J.

STEEL—Vanadium
Andrews Steel Co., Newport, Ky.
Central Alloy Steel Corp., Massillon, Ohio

STEEL PLANTS AND ROLLING MILLS
McKee, Arthur G., & Co., Cleveland, O.
Perin, O. P.—S. M. Marshall, 40 West 40th St., New York City.

STEEL PLATE CONSTRUCTION
Chicago Bridge & Iron Works, Chicago, Ill.
Cruse-Kemper Co., Ambler, Pa.
Hammond Iron Works, Warren, Pa.
Hendrick Mfg. Co., Carbondale, Pa.
Petroleum Iron Works Co., Sharon, Pa.
Riter-Conley Company, Pittsburgh, Pa.
Sotter Bros., Inc., Pottstown, Pa.
Steel Plate Products Co., Pottstown, Pa.
Tippett & Wood, Phillipsburg, N. J.

STEPS—Ladder and Stair, Non-Slipping
Hendrick Mfg. Co., Carbondale, Pa.

STEPS—Safety
Hendrick Mfg. Co., Carbondale, Pa.
Irving Iron Works Co., Long Island City, N. Y.

STOCKS AND DIES
Jones & Lamson Mach. Co., Springfield, Vt.
Saunders', D., Sons, Yonkers, N. Y.

STOKERS
American Engineering Co., Aramingo & Cumberland Sts., Philadelphia, Pa.
Babcock & Wilcox Co., The, 85 Liberty St., New York City.
Combustion Engineering Corp., 43 Broad St., New York City.

STOPPERS—Open Hearth, Bessemer or Electric
Ross-Tacony Crucible Co., Philadelphia, Pa.

STOPPERS—Open-Hearth Furnace
McCullough-Dalzell Crucible Co., Pitts., Pa.

STOVES—Hot Blast
Smythe, S. R., Co., Inc., The, Pittsburgh, Pa.

STRAIGHTENING MACHINES
Bliss, E. W., Co., 53d St., & 2d Ave., Brooklyn, N. Y.
Chambersburg Engrg. Co., Chambersburg, Pa.
Kane & Roach, Syracuse, N. Y.
Medart Company, The, St. Louis, Mo.
Shuster, F. B., Co., New Haven, Conn.
Whitney Metal Tool Co., Rockford, Ill.

STRUCTURAL IRON AND STEEL WORK
American Bridge Co., 71 Broadway, N. Y. C.
Austin Co., The, Cleveland, Ohio.
Belmont Iron Works, Philadelphia, Pa.
Berlin Construction Co., Inc., Berlin, Ct.
Bethlehem Construction Co., Bethlehem, Pa.
Bethlehem Steel Company, Bethlehem, Pa.
Morgan Eng. Co., Alliance, O.
New York Central Iron Wks., Co., Inc., Hagerstown, Md.
Phoenix Iron Co., Philadelphia, Pa.
Shoemaker Bridge Co., Pottstown, Pa.
Virginia Bridge & Iron Co., Roanoke, Va.

STRUCTURAL IRON WORKS MACHINERY
Espen-Lucas Mach. Works, Philadelphia, Pa.
Southwark Fdry. & Mch. Co., Philadelphia, Pa.

STRUCTURAL STEEL—See Angles, Beams, Channels and Tees

SULPHATE OF IRON
American Steel & Wire Co., Chicago, Ill.

SUPERHEATERS
Babcock & Wilcox Co., The, 85 Liberty St., New York City.

SWAGING MACHINES
Etna Machine Co., The, Toledo, O.
Standard Machinery Co., Auburn, R. I.
Torrington Co., Torrington, Ct.

TACKS
American Steel & Wire Co., Chicago, Ill.

TANKS—Compressed Air, Gas, Oil and Water
Air-Tight Steel Tank Co., Pittsburgh, Pa.
Caldwell, W. E., Co., 1940 Brook St., Louisville, Ky.
Cruse-Kemper Co., Ambler, Pa.
Hamburg Boiler Works, Inc., Hamburg, Pa.
Hammond Iron Works, Warren, Pa.
Koven, L. O., & Bro., Inc., Jersey City, N. J.
New York Central Iron Wks., Co., Inc., Hagerstown, Md.
Petroleum Iron Works Co., Sharon, Pa.
Scaife, Wm. B., & Sons Co., Pittsburgh, Pa.
Sotter Bros., Inc., Pottstown, Pa.
Struthers-Wells Co., Warren, Pa.
Tippett & Wood, Phillipsburg, N. J.
Tudor Boiler Mfg. Co., Cincinnati, O.

TANKS—Elevated Steel
Chicago Bridge & Iron Works, Chicago, Ill.

TANKS—Elevated Wood
Caldwell, W. E., Co., 1940 Brook St., Louisville, Ky.

TANKS—Gasoline and Oil
Chicago Bridge & Iron Wks., Chicago, Ill.

TANKS—Iron and Steel
Caldwell, W. E., Co., 1940 Brook St., Louisville, Ky.
Chicago Bridge & Iron Works, Chicago, Ill.
Hamburg Boiler Works, Inc., Hamburg, Pa.
Janney-Steinmetz & Co., Philadelphia, Pa.
Lancaster Iron Works, Inc., Lancaster, Pa.
Steel Plate Products Co., Pottstown, Pa.
Struthers-Wells Co., Warren, Pa.

TANKS—Pickling
Hauser-Stander Tank Co., Cincinnati, O.

TANKS—Rubber Lined
Hauser-Stander Tank Co., Cincinnati, O.

TANKS—Seamless Steel
National Tube Co., Pittsburgh, Pa.

TANKS—Stainless Steel
Struthers-Wells Co., Warren, Pa.

TANKS—Water
Hauser-Stander Tank Co., Cincinnati, O.
National Tube Co., Pittsburgh, Pa.

TANKS—Welded
Air-Tight Steel Tank Co., Pittsburgh, Pa.
National Tube Co., Pittsburgh, Pa.

TANKS—Wood
Caldwell, W. E., Co., 1940 Brook St., Louisville, Ky.
Hauser-Stander Tank Co., Cincinnati, O.

TAPPING MACHINES
Baker Bros., Inc., Toledo, O.
Barnes Drill Co., Rockford, Ill.
National Automatic Tool Co., Richmond, Ind.
Whitney Metal Tool Co., Rockford, Ill.

TAPS—Collapsing
Landis Machine Co., Inc., Waynesboro, Pa.
Murchey Mach. & Tool Co., Detroit, Mich.
National Acme Co., Cleveland, Ohio.

TAPS AND DIES
Brubaker, W. L., & Bros., Company, 50 Church St., New York City.
Greenfield Tap & Die Corp., Greenfield, Mass.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pipe Machinery Co., The, Cleveland, O.

TEES—See Angles, Beams, Channels and Tees

TELEGRAPH AND TELEPHONE LINE MATERIAL
Oliver Iron & Steel Corp., Pittsburgh, Pa.

TELEPHONE—Interior
Screw Machine Products Corp., Providence, R. I.

TERNE PLATES
American Sheet & Tin Plate Co., Pitts., Pa.
Sheet Steel Trade Extension Committee, Pittsburgh, Pa.

THREAD ROLLING MACHINES
National Machinery Co., Tiffin, O.
Nilson, A. H., Mach. Co., Bridgeport, Ct.
Waterbury Farrel Fdry. & Machine Co., Waterbury, Ct.

TIE PLATES
Joliet Wrought Washer Company, Joliet, Ill.

TIES—Bale
American Steel & Wire Co., Chicago, Ill.

TIES—Creosoted
Century Wood Preserving Co., Pittsburgh, Pa.

TIN PLATE
American Sheet & Tin Plate Co., Pitts., Pa.
Sheet Steel Trade Extension Committee, Pittsburgh, Pa.
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.

TINNERS' TOOLS AND MACHINES
Niagara Machine & Tool Works, Buffalo, N. Y.

TINWARE MACHINERY
Bliss, E. W., Co., 53d St. & 2d Ave., Brooklyn, N. Y.

TOOL HOLDERS
Armstrong Bros. Tool Co., Chicago, Ill.
Williams, J. H., & Co., Buffalo, N. Y.

TOOLS, JIGS, FIXTURES, Etc.
Mehl Machine Tool & Die Co., Roselle, N. J.
Reliable Mch. Co., Rockford, Ill.
Rono Mfg. Co., Chicago, Ill.
Screw Mch. Products Corp., Providence, R. I.

TOOLS—Lathe
Armstrong Bros. Tool Co., Chicago, Ill.

TOOLS—Machinists
Brown & Sharpe Mfg. Co., Providence, R. I.

TOOLS—Slag Digging
Rivet Cutting Gun Co., Cincinnati, Ohio

TOOLS—Steam and Gas Fitters
Saunders', D., Sons, Yonkers, N. Y.

TORCHES—Blow
Hauck Mfg. Co., 128 Tenth St., Brooklyn, N. Y.

TOWERS—Steel
Caldwell, W. E. Co., 1940 Brook St., Louisville, Ky.

TOWERS—Transmission
American Bridge Co., 71 Broadway, N. Y. C.

TOWERS — Water — See Tanks — Elevated Steel and Wood

TRACK—Industrial
Bethlehem Steel Co., Bethlehem, Pa.

TRAILERS—Industrial
Chase Fdry. & Mfg. Co., Columbus, Ohio.

TRAMRAILS—Overhead Systems
Armington Engineering Co., Euclid, O.
Chisholm-Moore Mfg. Co., Cleveland, Ohio.
Cleveland Electric Tramrail, Wickliffe, Ohio.

TRAMWAYS—Wire Rope
American Steel & Wire Co., Chicago, Ill.
Broderick & Bascom Rope Co., St. Louis, Mo.
Leschen, A., & Sons Rope Co., St. Louis, Mo.

TRAPS—Steam and Radiator
Nicholson, W. H., & Co., 115 Oregon St., Wilkes-Barre, Pa.
Strong, Carlisle & Hammond Co., The, Cleveland, O.

TREADS—Non-Slipping
Hendrick Mfg. Co., Carbondale, Pa.

TREADS—Stair
Hendrick Mfg. Co., Carbondale, Pa.

TROLLEYS
Chisholm-Moore Mfg. Co., Cleveland, Ohio.
Ford Chain Block Co., Philadelphia, Pa.
Hanna Engineering Works, Chicago, Ill.
Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.
Wright Mfg. Co., Lisbon, O.

TRUCKS—Elevating
Lewis-Shepard Co., Boston, Mass.
Wright-Hibbard Industrial Elec. Truck Co., Inc., Phelps, N. Y.

TRUCKS—Industrial
Chase Fdry. & Mfg. Co., Columbus, Ohio.
Sterling Wheelbarrow Co., Milwaukee, Wis.

TRUCKS AND TRACTORS—Electric Industrial
Atlas Car & Mfg. Co., Cleveland, O.
Elwell-Parker Elec. Co., Cleveland, O.
Wright-Hibbard Industrial Elec. Truck Co., Inc., Phelps, N. Y.

TUBE MILL MACHINERY
Standard Engineering Co., Ellwood City, Pa.
United Engrg. & Fdry. Co., Pittsburgh, Pa.

TUBES—Boiler
Allegheny Steel Co., Brackenridge, Pa.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Keating, E. F., Co., 452 Water St., N. Y. C.
National Tube Co., Pittsburgh, Pa.
Potts, Horace T., & Co., Philadelphia, Pa.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Tyler Tube & Pipe Co., The, Washington, Pa.
Ullman, Jacob, Buffalo, N. Y.
Williams & Co., Inc., 911 Pennsylvania Ave., N.S., Pittsburgh, Pa.

TUBES—Boiler, Charcoal Iron
Bethlehem Steel Co., Bethlehem, Pa.
Keating, E. F., Co., 452 Water St., N. Y. C.
Tyler Tube & Pipe Co., Washington, Pa.
Williams & Co., Inc., 911 Pennsylvania Ave., N. S., Pittsburgh, Pa.

TUBES—Nickel Silver
American Brass Co., Waterbury, Conn.
Mohegan Tube Co., The, 300-400 Scott Ave., Brooklyn, N. Y.
Seymour Mfg. Co., Seymour, Ct.
Summerill Tubing Co., Bridgeport, Montgomery County, Pa.

TUBING—Brass, Bronze, Copper or Nickel Silver
Conklin, T. F., Brass & Copper Co., Inc., 54 Lafayette St., New York City.

TUBING—Chrome Alloy
Chrome Alloy Tube Corp., Newark, N. J.

TUBING—Condenser
American Brass Co., Waterbury, Conn.

TUBING—Flexible Metallic
American Metal Hose Co., Waterbury, Ct.
Pennsylvania Flexible Metallic Tubing Co., Philadelphia, Pa.
Roller Bearing Co. of America, Newark, N. J.

TUBING—Lock Seamed
Stolp Company, Inc., Geneva, N. Y.

TUBING—Monel Metal
Mohegan Tube Co., The, 300-400 Scott Ave., Brooklyn, N. Y.

TUBING—Nichrome
Mohegan Tube Co., The, 300-400 Scott Ave., Brooklyn, N. Y.

TUBING—Open-Seam
Mohegan Tube Co., The, 300-400 Scott Ave., Brooklyn, N. Y.

TUBING—Seamless Aluminum
Summerill Tubing Co., Bridgeport, Montgomery County, Pa.

TUBING—Seamless Brass and Copper
American Brass Co., Waterbury, Conn.
Rome Mfg. Company, Rome, N. Y.
Service Steel Company, Detroit, Mich.
Summerill Tubing Co., Bridgeport, Montgomery County, Pa.

TUBING—Seamless, Stainless
Firth, Thos., & Sons, Inc., Hartford, Ct.

TUBING—Seamless Steel
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Keating, E. F., Co., 452 Water St., N. Y. C.
Mohegan Tube Co., The, 300-400 Scott Ave., Brooklyn, N. Y.
National Tube Co., Pittsburgh, Pa.
Pittsburgh Steel Prod. Co., Pittsburgh, Pa.
Roland Steel Co., Inc., 114 Liberty Street, N. Y. C.
Service Steel Company, Detroit, Mich.
Summerill Tubing Co., Bridgeport, Montgomery County, Pa.
Wharton, William, Jr., & Co., Inc., Easton, Pa.
Williams & Co., Inc., 911 Pennsylvania Ave., N. S., Pittsburgh, Pa.

TUBING—Square and Rectangular
Mohegan Tube Co., The, 300-400 Scott Ave., Brooklyn, N. Y.
National Tube Co., Pittsburgh, Pa.
Summerill Tubing Co., Bridgeport, Montgomery County, Pa.

TUBING—Welded Steel
Metal Forming Corp., Elkhart, Ind.
Mohegan Tube Co., The, 300-400 Scott Ave., Brooklyn, N. Y.
National Tube Co., Pittsburgh, Pa.
Tyler Tube & Pipe Co., The, Washington, Pa.

TUBING MACHINERY—Brazed
Etna Machine Co., The, Toledo, O.

TUBING MACHINES—Lock Seaming
Stolp Company, Inc., Geneva, N. Y.

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Baird Machine Co., Bridgeport, Conn.
Globe Mach. & Stpg. Co., Cleveland, O.
Ideal Concrete Machry. Co., Cincinnati, O.
Paxson, J. W., Co., Philadelphia, Pa.
Sly, W. W., Mfg. Company, Cleveland, O.

TURBINES
De Laval Steam Turbine Co., Trenton, N. J.

TURNBUCKLES
Laughlin, Thomas, Co., The, Portland, Me.
Merrill Bros., Maspeth, N. Y.

TUYERES—Coolers, etc., Blast Furnace
Keystone Bronze Co., Pittsburgh, Pa.

TWIST DRILLS
Buckeye Twist Drill Co., The, Alliance, O.
Cleveland Twist Drill Co., Cleveland, O.
Greenfield Tap & Die Corp., Greenfield, Mass.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
National Twist Drill & Tool Co., Detroit, Mich.
Union Twist Drill Co., Athol, Mass.

UNIONS
Crane Co., Chicago, Ill.
Dart, E. M., Mfg. Co., Providence, R. I.
Jefferson Union Co., Lexington, Mass.

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National Machinery Co., Tiffin, Ohio.

VALVES—Air
Powell, William, Company, Cincinnati, O.

VALVES—Back Pressure and Automatic Relief
Crane Co., Chicago, Ill.

VALVES—Blow Off
Crane Co., Chicago, Ill.

VALVES—Gas and Air Reversing
McKee, Willis, Cleveland, O.
Morgan Construction Co., Worcester, Mass.
Smythe, S. H., Co., Inc., The, Pittsburgh, Pa.
Swindell, W. & Bros., Box 1753, Pittsburgh, Pa.

VALVES—Gas, Water and Steam
Jarecki Mfg. Co., Erie, Pa.
Jenkins Bros., 80 White St., New York City.
Pittsburgh Valve Fdry. & Con. Co., Pittsburgh, Pa.
Powell, William, Co., Cincinnati, O.
Wood, R. D., & Co., Philadelphia, Pa.

VALVES—Gate
Crane Co., Chicago, Ill.

VALVES—Globe, Angle and Check
Crane Co., Chicago, Ill.

VALVES—Hydraulic
Crane Co., Chicago, Ill.
Birdsboro Steel Fdry. & Mch. Co., Birdsboro, Pa.
Chambersburg Engrg. Co., Chambersburg, Pa.
Hydraulic Press Mfg. Co., The, Columbus, O.
Powell, William, Company, Cincinnati, O.
Watson-Stillman Co., 75 West St., N. Y. C.
Wood, R. D., & Company, Philadelphia, Pa.

VALVES—(Pressure Seated) Pneumatic
Cleveland Pneumatic Tool Co., The, Cleveland, O.

VALVES—Radiator
Crane Co., Chicago, Ill.

VISES
Eagle Anvil Works, Trenton, N J.
Jarecki Mfg. Co., Erie, Pa.

WALKWAYS—Open Steel
Irving Iron Works Co., Long Island City, N. Y.

WASHERS—Brass, Bronze or Copper
Everitt Co., The, Boston, Mass.

WASHERS—Iron and Steel
Bethlehem Steel Company, Bethlehem, Pa.
Bettcher Stamping & Mfg. Co., Cleveland, O.
Central Iron & Steel Co., Harrisburg, Pa.
Griffin Mfg. Company, Erie, Pa.
Joliet Wrought Washer Company, Joliet, Ill.
Nicetown Plate Washer Co., Inc., Phila., Pa.
Positive Lock Washer Co., Newark, N. J.
Sessions, J. H., & Son, Bristol, Ct.
Wrought Washer Mfg. Co., Milwaukee, Wis.

WASHERS—Leather
Chicago Rawhide Mfg. Co., 1313 Elston Ave., Chicago, Ill.

WASHERS—Lock
National Umbrella Frame Co., Philadelphia, Pa.
Palnut Co., The, Irvington, N. J.
Positive Lock Washer Co., Newark, N. J.

WASHERS—Spring Steel
Dunbar Bros. Co., Bristol, Ct.
Positive Lock Washer Co., Newark, N. J.

WASHERS—Tempered
Barnes, Wallace, Co., The, Bristol, Ct.
Positive Lock Washer Co., Newark, N. J.

WASHERS—Wrought
Wrought Washer Mfg. Co., Milwaukee, Wis.

WASHING MACHINES—For Metal Parts
Detroit Sheet Metal Wks., Detroit, Mich.
Ideal Concrete Machry. Co., Cincinnati, O.
No-Dust Drying Mach. Co., Waterbury, Ct.

WATER COOLED FURNACES
Combustion Engng. Corp., 43 Broad St., New York City.

WATER SOFTENING AND PURIFYING
Scaife, Wm. B., & Sons Co., Pittsburgh, Pa.

WAX—Vent, Core and Pattern
United Compound Co., Buffalo, N. Y.

WEDGES—Foundry
Sterling Wheelbarrow Co., Milwaukee, Wis.

WELDING—Electric
Federal Mch. & Welder Co., Warren, O.
General Electric Co., Schenectady, N. Y.
Taylor-Hall Welding Corp., 1 May St., Worcester, Mass.
Thomson Electric Welding Co., 661 Pleasant St., Lynn, Mass.

WELDING—Forge and Hammer
Blaw-Knox Co., Pittsburgh, Pa.

WELDING—Oxy-Acetylene
Weldit Acetylene Co., Detroit, Mich.

WELDING—Thermit
Metal & Thermit Corp., 120 Broadway, N. Y. C.

WELDING COMPOUNDS
Anti-Borax Compound Co., Ft. Wayne, Ind.

WELDING AND CUTTING MACHINES AND EQUIPMENT—Oxy-Acetylene
Air Reduction Sales Co., 342 Madison Ave., New York City.
Imperial Brass Mfg. Co., Chicago, Ill.
International Oxygen Co., Newark, N. J.
Smith Welding Equipment Corp., Minneapolis, Minn.
Weldit Acetylene Co., Detroit, Mich.

WELDING EQUIPMENT—Fluxes
Chromium Corp. of America, 26 Broadway, New York City.

WELDING MACHINES—Butt
Federal Mch. & Welder Co., Warren, Ohio.
Swift Electric Welder Co., 635 Mount Elliott Ave., Detroit, Mich.
Thomson Electric Welding Co., 661 Pleasant St., Lynn, Mass.

WELDING MACHINES—Electric Arc
Williams & Co., Inc., 911 Pennsylvania Ave., N. S., Pittsburgh, Pa.
Wilson Welder & Metals Co., Inc., Wilson Bldg., Hoboken Factory Terminal, Hoboken, N. J.

WELDING MACHINES — (Electric Arc) Secand Hand
Goodman Elec. Mchry. Co., Newark, N. J.

WELDING MACHINES—Seam
Federal Mch. & Welder Co., Warren, O.

WELDING MACHINES—Spot
Federal Mch. & Welder Co., Warren, O.
Swift Electric Welder Co., 635 Mount Elliott Ave., Detroit, Mich.
Taylor Welder Co., Warren, O.
Thomson Electric Welding Co., 661 Pleasant St., Lynn, Mass.

WELDING MACHINES — (Spot) Second Hand
Goodman Elec. Mchry. Co., Newark, N. J.

WHEELBARROWS—Foundry
Sterling Wheelbarrow Co., Milwaukee, Wis.

WHEELS—Cast
Stroh Steel-Hardening Process Co., Pittsburgh, Pa.

WHEELS—Rolled Steel
Bethlehem Steel Company, Bethlehem, Pa.
Carnegie Steel Co., Pittsburgh, Pa.

WINCHES
Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.

WINDOW CLEANING MATERIALS
Skybryte Co., The, Cleveland, Ohio.

WINDOWS—Steel
Truscon Steel Co., Youngstown, O.

WIRE—Barb
American Steel & Wire Co., Chicago, Ill.
Bethlehem Steel Company, Bethlehem, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.

WIRE—Brass, Bronze, Copper or Nickel Silver
American Brass Co., Waterbury, Conn.
Conklin, T. E., Brass & Copper Co., Inc., 54 Lafayette St., New York City.
Seymour Mfg. Co., Seymour, Conn.

WIRE—Broom
American Steel & Wire Co., Chicago, Ill.
Seneca Wire & Mfg. Co., Fostoria, O.
Wickwire Spencer Steel Co., 41 E. 42nd St., N. Y. C.

WIRE—Flat, Round, Square or Special Shapes
American Steel & Wire Co., Chicago, Ill.
De Haven Mfg. Co., 50-54 Columbia Heights, Brooklyn, N. Y.
Hartshorn, Stewart, Co., 250 Fifth Ave., New York City.
Miller & Van Winkle, Inc., 18 Bridge St., Brooklyn, N. Y.
Prentiss, Geo. W., & Co., Holyoke, Mass.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., Fostoria, O.
Townsend Co., New Brighton, Pa.
Washburn Wire Co., 118th St. & Harlem River, New York City.
Webb Wire Works, New Brunswick, N. J.
Wickwire Bros., Cortland, N. Y.
Wickwire Spencer Steel Co., 41 E. 42nd St., N. Y. C.

WIRE—Insulated
American Steel & Wire Co., Chicago, Ill.

WIRE—Mattress
American Steel & Wire Co., Chicago, Ill.
Wickwire Spencer Steel Co., 41 E. 42nd St., N. Y. C.

WIRE—Netting
American Steel & Wire Co., Chicago, Ill.
Bethlehem Steel Company, Bethlehem, Pa.
Ludlow-Saylor Wire Co., 600-610 Newstead Ave., St. Louis, Mo.
New Jersey Wire Cloth Co., Trenton, N. J.
Wickwire Brothers, Cortland, N. Y.
Wickwire Spencer Steel Co., 41 E. 42nd St., N. Y. C.

WIRE—Nickel
Seymour Mfg. Co., Seymour, Ct.

WIRE—Phosphor Bronze
American Brass Co., Waterbury, Conn.
Phosphor Bronze Smelting Co., Phila., Pa.
Seymour Mfg. Co., Seymour, Ct.

WIRE—Piano and Music
American Steel & Wire Co., Chicago, Ill.
Washburn Wire Co., 118th St. & Harlem River, New York City.
Webb Wire Works, New Brunswick, N. J.
Wickwire Spencer Steel Co., 41 E. 42nd St., N. Y. C.

WIRE—Rubber Covered
American Steel & Wire Co., Chicago, Ill.
Hazard Mfg. Co., Wilkes-Barre, Pa.

WIRE—Spoke and Crimping
American Steel & Wire Co., Chicago, Ill.
Prentiss, Geo. W., & Co., Holyoke, Mass.

WIRE—Spring Steel
American Steel & Wire Co., Chicago, Ill.
Barnes, Wallace Co., The, Bristol, Ct.
Bethlehem Steel Co., Bethlehem, Pa.
Hartshorn, Stewart Co., 250 5th Ave., N. Y. C.
Wickwire Spencer Steel Co., 41 E. 42nd St., N. Y. C.

WIRE—Stainless Steel
Firth, Thos., & Sons, Inc., Hartford, Ct.

WIRE—Telephone and Telegraph
American Steel & Wire Co., Chicago, Ill

WIRE—Trolley
American Steel & Wire Co., Chicago, Ill.

WIRE—Welding
Roebling's, John A., Sons Co., Trenton, N. J.
Ryerson, Jos. T., & Sons, Inc., Chicago, Ill.
Wickwire Spencer Steel Co., 41 E. 42nd St., N. Y. C.
Williams & Co., Inc., 911 Pennsylvania Ave., N. S., Pittsburgh, Pa.
Wilson Welder & Metals Co., Inc., Wilson Bldg., Hoboken Factory Terminal, Hoboken, N. J.

WIRE COILING MACHINERY
Baird Machine Co., Bridgeport, Ct.
Sleeper & Hartley, Inc., Worcester, Mass.

WIRE DRAWING MACHINERY
Morgan Construction Co., Worcester, Mass.
New England Wire Machinery Co., New Haven, Ct.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machry. Co., Cuyahoga Falls, O.
Waterbury-Farrell Fdry. & Mach. Co., Waterbury, Ct.

WIRE FORMING MACHINERY
Baird Machine Co., Bridgeport, Ct.
Manville, E. J., Mach. Co., Waterbury, Ct.
Nilson, A. H., Mach. Co., Bridgeport, Ct.
Sleeper & Hartley, Inc., Worcester, Mass.

WIRE MILL MACHINERY AND EQUIPMENT
Morgan Construction Co., Worcester, Mass.
New England Wire Machinery Co., New Haven, Conn.
Shuster, F. B., Co., New Haven, Ct.
Vaughn Machinery Co., Cuyahoga Falls, O.

WIRE NAIL MACHINERY
National Machinery Co., Tiffin, O.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Sleeper & Hartley, Inc., Worcester, Mass.

WIRE STRAIGHTENING AND CUTTING MACHINERY—Automatic
Nilson, A. H., Machine Co., Bridgeport, Ct
Shuster, F. B. Co., New Haven, Ct.
Worthington Pump & Mchry. Corp., 115 B'way, N. Y. C.

WIRE STRANDING & CLOSING MACHINES
New England Wire Machinery Co., New Haven, Ct.
Sleeper & Hartley, Inc., Worcester, Mass.

WIRE CLOTH
Ludlow-Saylor Wire Co., 600-610 Newstead Ave., St. Louis, Mo.
N. J. Wire Cloth Co., Trenton, N. J.
Wickwire Bros., Cortland, N. Y.
Wickwire Spencer Steel Co., 41 E. 42nd St., N. Y. C.

WIRE CLOTH—Brass, Bronze or Copper
Conklin, T. E., Brass & Copper Co., Inc., 54 Lafayette St., New York City.

WIRE FORMING
American Spring & Mfg. Corp., Holley, Mich.
American Steel & Wire Co., Chicago, Ill.
Cleveland Wire Spring Co., Cleveland, O.
Cuyahoga Spring Co., Cleveland, O.
Eastern Tool & Mfg. Co., Bloomfield, N. J.
Hindley Mfg. Co., Valley Falls, R. I.
Jenkinson, R. C., & Co., Newark, N. J.
Torrington Co., Torrington, Ct.
U. S. Steel Wire Spring Co., The, Cleveland, Ohio.
Warner Brothers Co., Bridgeport, Ct.
Wickwire Bros., Cortland, N. Y.
Wickwire Spencer Steel Co., 41 E. 42nd St., N. Y. C.

WIRE ROPE
American Cable Co., Inc., 105 Hudson St., New York City.
American Steel & Wire Co., Chicago, Ill.
Broderick & Bascom Rope Co., St. Louis, Mo.
Hazard Mfg. Co., Wilkes-Barre, Pa.
Leschen, A., & Sons Rope Co., St. Louis, Mo.
Roebling's, John A., Sons Co., Trenton, N. J.
Wickwire Spencer Steel Co., 41 E. 42nd St., N. Y. C.

WIRE ROPE FITTINGS
American Cable Co., Inc., 105 Hudson St., New York City.
American Steel & Wire Co., Chicago, Ill.
Laughlin, Thomas, Co., The, Portland, Me.
Roebling's, John A., Sons Co., Trenton, N. J.

WOOD BLOCK FLOORING—See Flooring—Creosoted Wood

WOOD WORKING MACHINERY
American Saw Mill Mchry. Co., 181 Main St., Hackettstown, N. J.
Osborne & Sexton Machry. Co., Columbus, O.

WRENCHES
Armstrong Bros. Tool Co., Chicago, Ill.
Cleveland Punch & Shear Wks. Co., Cleve., O.
Drop Forging Co. of N. Y., Jersey City, N. J.
Indianapolis Drop Forging Co., Indianapolis, Ind.
Williams, J. H., & Co., Buffalo, N. Y.

ZINC—Cold Rolled Strips
Platt Bros. & Co., The, Waterbury, Ct.

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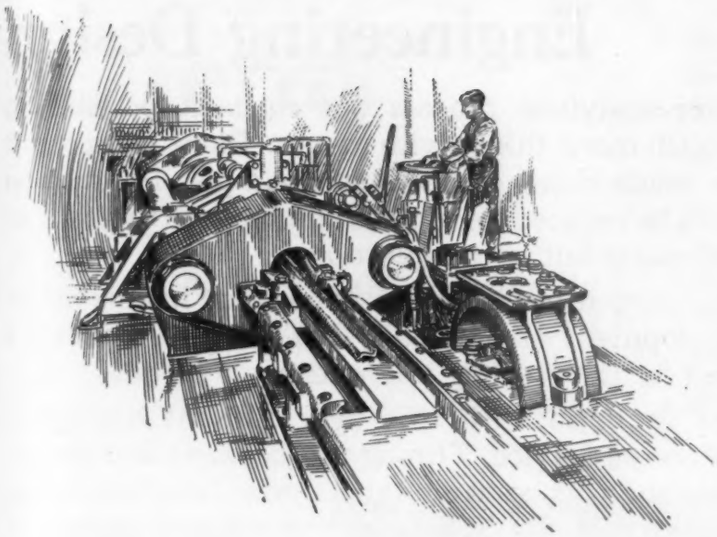

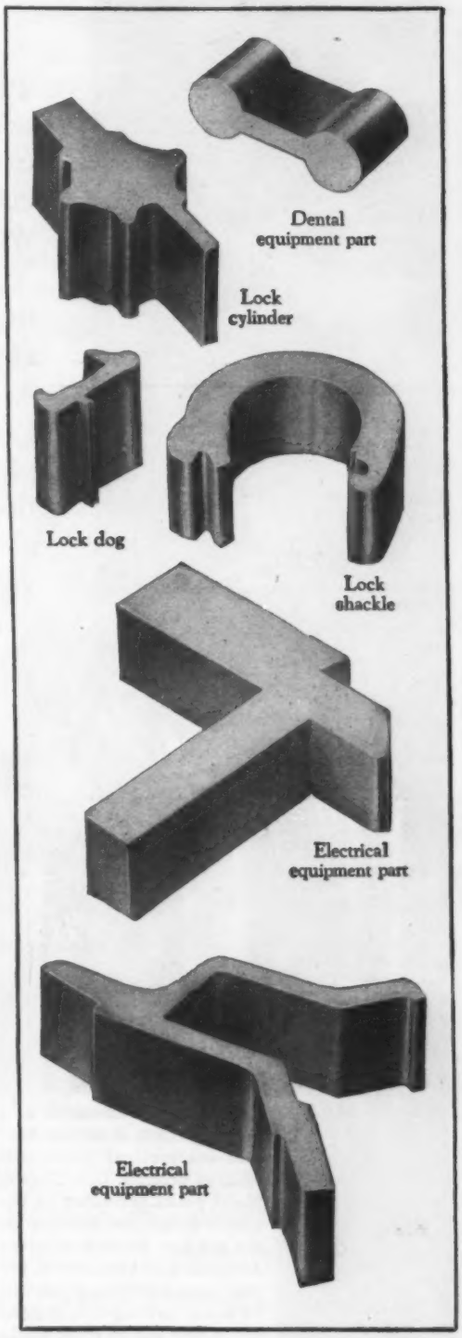

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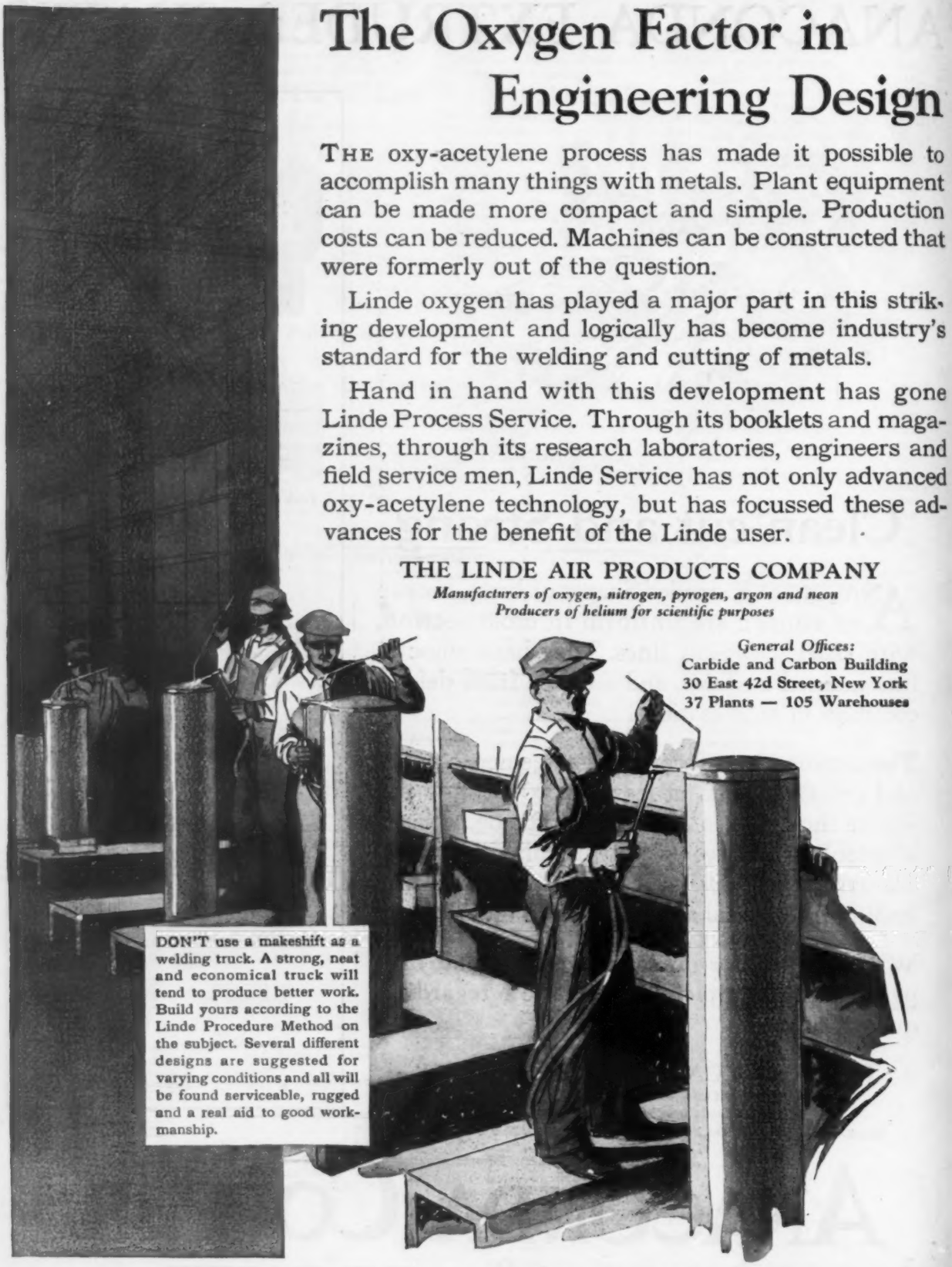

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